i8094 快速上手手冊

(Version 2.4)

i8094 C++ 巨集指令函式庫快速上手
PAC WinCon-8000、I-8000 系列控制器
(適用於 i8094, i8094F)



ICP DAS CO., LTD.
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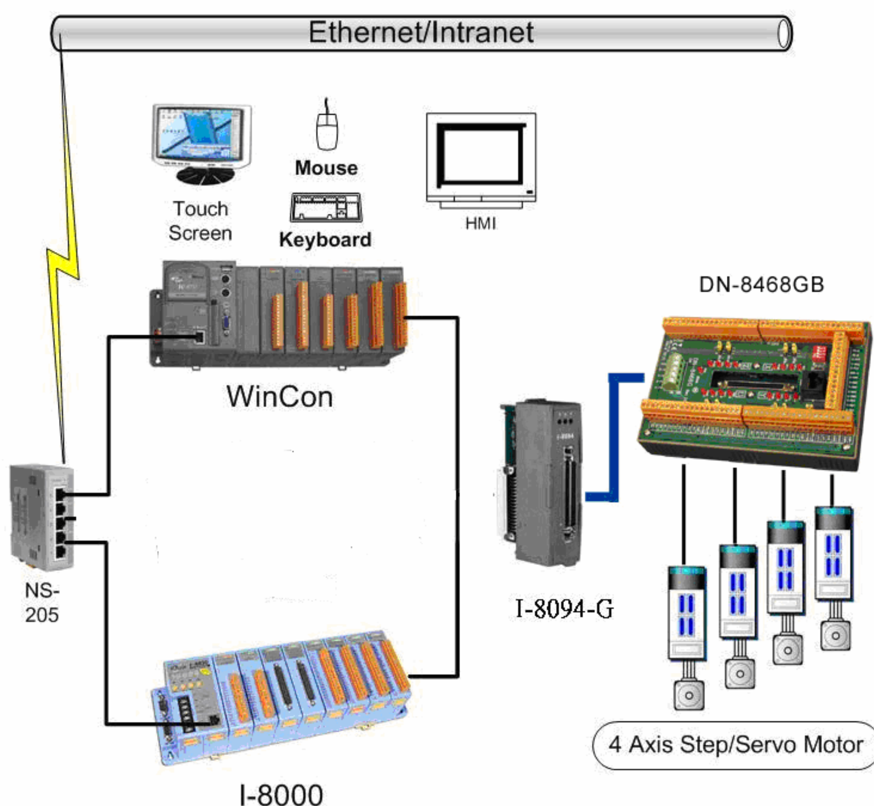
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1 i8094 運動控制器模組簡介

1.1 i8094 簡介

i8094 是一個支援 **4** 軸步進/伺服馬達運動控制模組，輸出 **Pulse** 可高達 **4M PPS**，配合泓格公司 **I-8000** 及 **WinCon-8000**，其中之一控制器上。**i8094** 運動控制模組適合一般運動控制應用，提供非常多的運動控制功能讓客戶使用，例如 **2/3** 軸直線補間、**2** 軸圓(弧)補間、**T/S** 加減速曲線、多軸組合的同步運動、可規劃的自動歸原點等等，而 **i8094** 在執行上述功能時，並不需耗用 **I-8000** 或 **WinCon** 系統資源，**CPU** 可同時監控其他執行狀態，由於只耗用少量系統資源，因此可以在 **I-8000** 或 **WinCon-8000** 插上多個 **i8094** 模組，以多軸(**4**、**8….**)運動控制於同一控制器上。泓格亦提供相當多的範例程式及巨集功能，以減少程式設計的工時，符合低成本高效能的運動控制系統設計平台。



I8094 與控制器規劃圖 **(WinCon-8000**、**I-8000)**

1.2 硬體規格

1.2.1 主要規格

■ 控制晶片	MCX314As
■ 控制軸數	4 軸,脈波式輸出(步進或伺服馬達)
■ 最大輸出脈波速度	4 M PPS

1.2.2 補間功能

2-軸 / 3-軸 直線補間

■ 每一軸補間區間	−2,147,483,646 ~ +2,147,483,646
■ 補間向量速度	1 PPS ~ 4 M PPS
■ 補間精度	± 0.5 LSB

圓弧補間

■ 每一軸補間區間	−2,147,483,646 ~ +2,147,483,646
■ 補間向量速度	1 PPS ~ 4 M PPS

相關補間功能

- ■ 可以選擇任意軸補間
- ■ 固定向量速度
- ■ 可連續補間

1.2.3 輸出脈衝

■ 脈衝輸出速度範圍	1 PPS ~ 4 MPPS
■ 脈衝輸出精度	± 0.1%
■ S-曲線衝量(Jerk) 範圍	954 ~ 62.5 x 10^6 PPS/S^2 477 x 10^3 ~ 31.25 x 10^9 PPS/S^2
■ 加減速範圍	125 ~ 1 x 10^6 PPS/S 62.5×10^3 ~ 500 x 10^6 PPS/S
■ 速度精度	1 PPS 到 500PPS(依最高速而定)
■ 脈衝輸出數	0 ~ 4,294,967,295 / unlimited

- ■ 速度曲線型態:
  - ◆ 定速
  - ◆ 對稱與非對稱線性加減速
  - ◆ 對稱與非對稱S型加減速

- ■ 減速度模式
  - ◆ 自動(對稱線性加減速) Auto
  - ◆ 自訂

- 於驅動中途可以動態改變速度及脈波數
- 定數脈波輸出可以用 T/S-曲線加減速
- 可選脈波輸出為CW/CCW 或 PULSE/DIR 方式
- 可以選擇邏輯準位

1.2.4 編碼器輸入

- 可選擇 A/B 相脈衝輸入或 Up/Down 脈衝輸入
- 可選擇 1、2 及 4 除頻 (A/B 相脈衝輸入)

1.2.5 位置計數器

- 指令位置計數器範圍 −2,147,483,648 ~ +2,147,483,647
- 實際位置(編碼器輸入)計數器範圍 −2,147,483,648 ~ +2,147,483,647
- 可設定為環狀計數器功能(圓位置)
- 編碼器輸入可設定反方向
- 實際位置可利用DI(IN3)輸入清除為零
- 位置計數器可以讀取，也可以設定

1.2.6 自動歸原點

- 自動歸原點步驟
  - 步驟 1 (高速找 ”近原點” 感測器)
  - 步驟 2 (低速找 ”原點” 感測器)
  - 步驟 3 (低速找伺服馬達Z相感測器)
  - 步驟 4 (高速到補正值位置)

每一步驟都可設定要不要執行及其找尋方向

1.2.7 伺服馬達輸入訊號 Servo Motor Input Signal

- 警告 (Alarm)
- 可選擇伺服到位(In Position Check) 或 伺服就序(Servo Ready)
- 可以選擇 有效/無效 及 邏輯準位

1.2.8 極限訊號輸入

- 各軸 2 個極限訊號輸入+ 極限, − 極限
- 可以選擇 邏輯準位 及碰觸極限後可 減速停或急停

1.2.9 其它輸入訊號 Other Input Signals

- 各軸 **IN3** 可以用來做其他用途，如同期控制中之輸入事件

1.2.10 緊急停止訊號輸入, Emergency Stop Signal Input

- 每一模組提供一個緊急停止信號輸入

1.2.11 一般輸出訊號 General Output Signal

- 各軸 **nOUT1** 作為控制**Servo On/Off** 信號

1.2.12 整合輸入濾波器 Contents of integral type filters

- 對模組中一般**DI**輸入信號可以設定雜訊數位濾波**(**時間參數**)**功能

1.2.13 軟體極限

- 各軸可支援 **2** 個軟體極限 **+** 極限**, −** 極限 **(−2,147,483,646 ~ +2,147,483,646)**

1.2.14 手動外部輸入信號驅動

- 固定**Pulse**數驅動**(Fixed Pulse Driving Mode)**
- 連續**Pulse**驅動**(Continuous Pulse Driving Mode)**
- 手輪**Pulse**驅動**(Manual pulsar mode)**

1.2.15 模組狀態顯示 LED

- 紅燈 → 電源指示燈
- 橘燈 → **Servo Alarm** 指示燈 **(**驅動器輸出**ON**橘燈亮**)**
  例**:**三菱驅動器故障**(ALM)**，無異警時輸出**ON**，橘燈亮
- 綠燈 → **Motion** 動作指示燈

1.2.16 FRnet 分散式 DI/O (i8094F 專用功能)

- **DI** → **128** 點
- **DO** → **128** 點
- 可搭配 **FRnet I/O** 模組動態增減點數

1.3 環境參數 Environment

- 工作溫度 -20 ~ + 75°C
- 儲存溫度 -30 ~ +85°C
- 工作濕度 10 ~ 85%，非結露non-condensing
- 儲存濕度 5 ~ 90%，非結露non-condensing
- I/O 信號隔離 2500Vrms
- 外部供給電壓 24V DC (接線子板)

1.4 採購資訊 Ordering Information

- I-8000、W-8000 嵌入式控制器系列主機(請洽相關業務單位)
- i8094 4軸運動控制器模組
- DN-8468GB 一般通用馬達配接端子板
- DN-8468DB 台達馬達專用端子板
- DN-8468MB 三菱J2馬達專用端子板
- DN-8468PB Panasonic A4馬達專用端子板
- DN-8468YB Yaskawa馬達專用端子板
- CA-SCSI15 68-pin SCSI-II 接頭線，長度:1.5 m

2 硬體接線

2.1 i8094 檢查包裝,及安裝

2.1.1 檢查包裝

i8094 是一個支援 **4** 軸 步進/伺服 馬達運動控制模組，配合泓格公司 **I-8000**、**WinCon-8000**、嵌入式控制器系列主機使用，基本上須配和如下主機產品

- **I-8000**、**W-8000** 嵌入式**PAC**控制器系列主機**(**擇其一**)**

i8094 需用之產品

- **i8094** **4**軸運動控制器模組
- **DN-8468** **i8094** 配線端子板
- **CA-SCSI15** **68-pin SCSI-II** 接頭線，長度**:1.5 m**

2.1.2 i8094 安裝

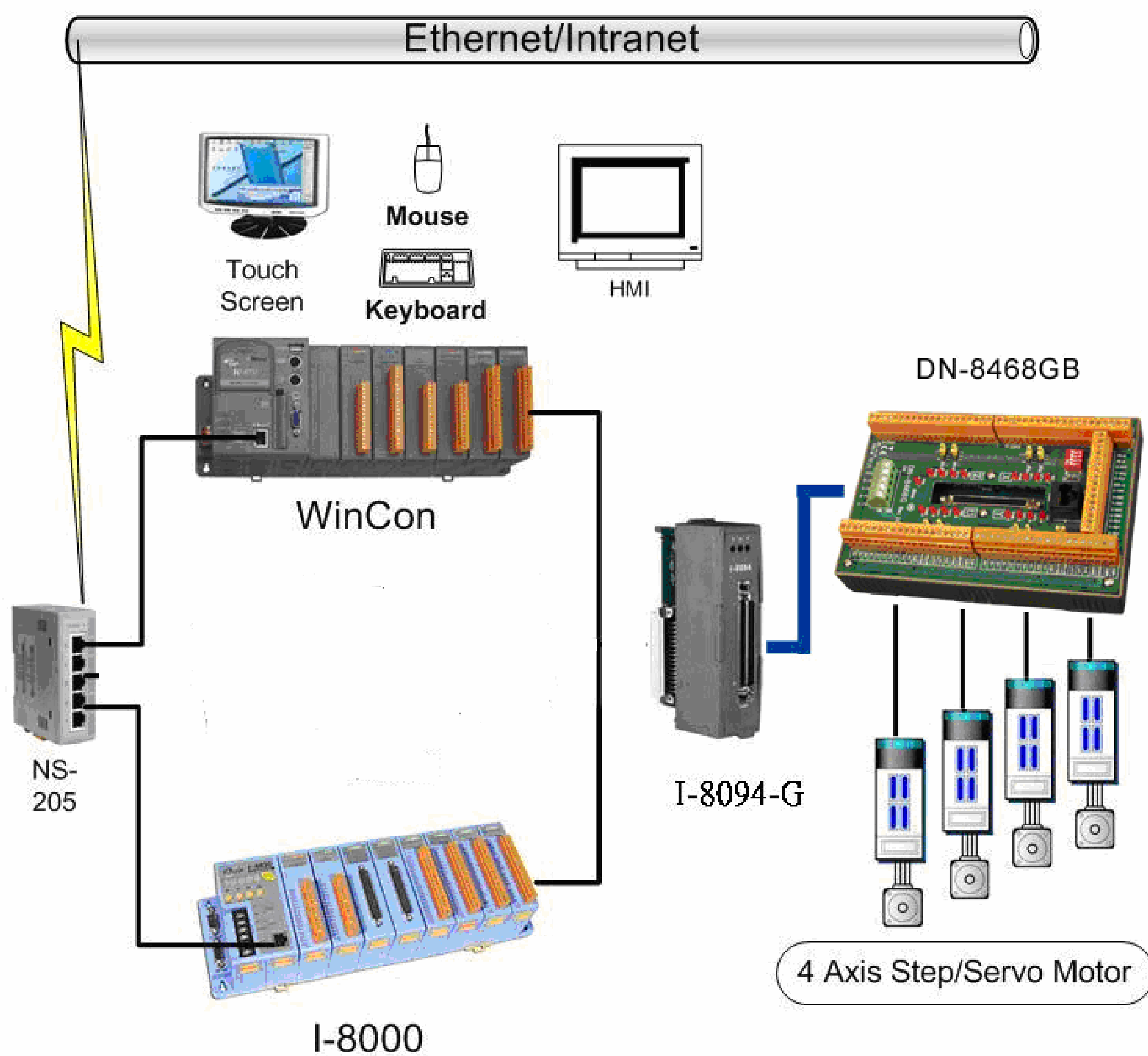
準備控制器

I-8000、**W-8000**、嵌入式控制器系列主機**(**擇其一**),**並選用有空 **IO** 插槽之型號**,**請先將電源關閉。

插入模組,及連接線

選一嵌入式控制器空**IO**插槽，將**i8094**小心依導槽插入**I-8000**、**W-8000** 嵌入式控制器**,**並用**CA-SCSI15**聯接到 **DN-8468**配線端子板，如下圖**:**


I-8094-G
PC
Ethernet / Intranet
NS-205
Ethernet / Intranet
4 Axis Step/Servo Motor



i8094 與控制器規劃圖 (WinCon-8000、I-8000)

2.2 DN-8468 端子板

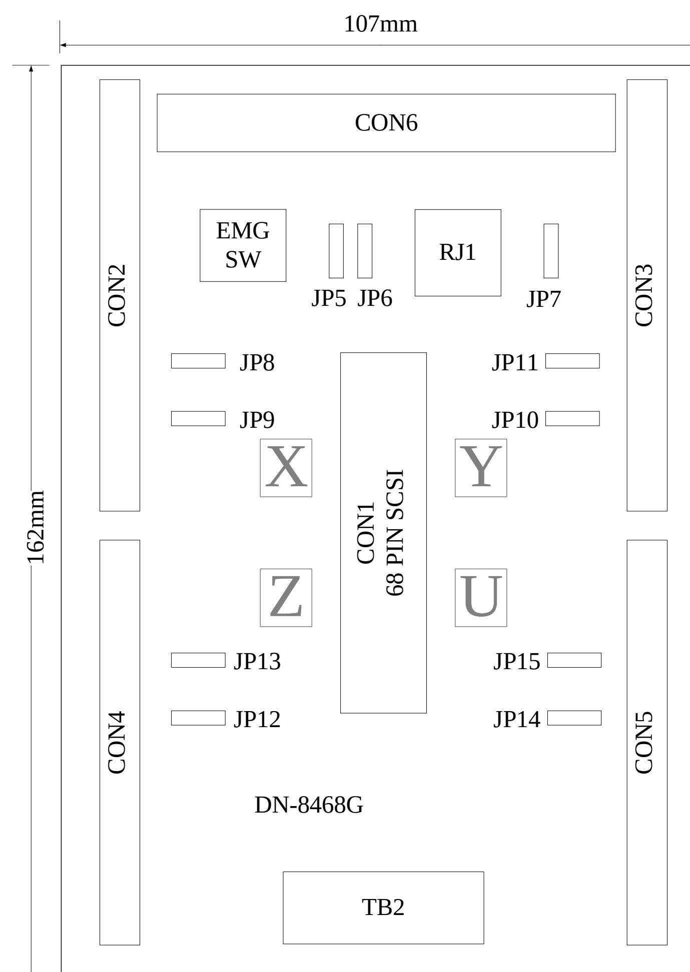


Fig. 2.0 DN-8468 位置圖

2.2.1 腳位定義

■ **CON1：PISO-PS400 卡與 DN-8468 連接接頭**

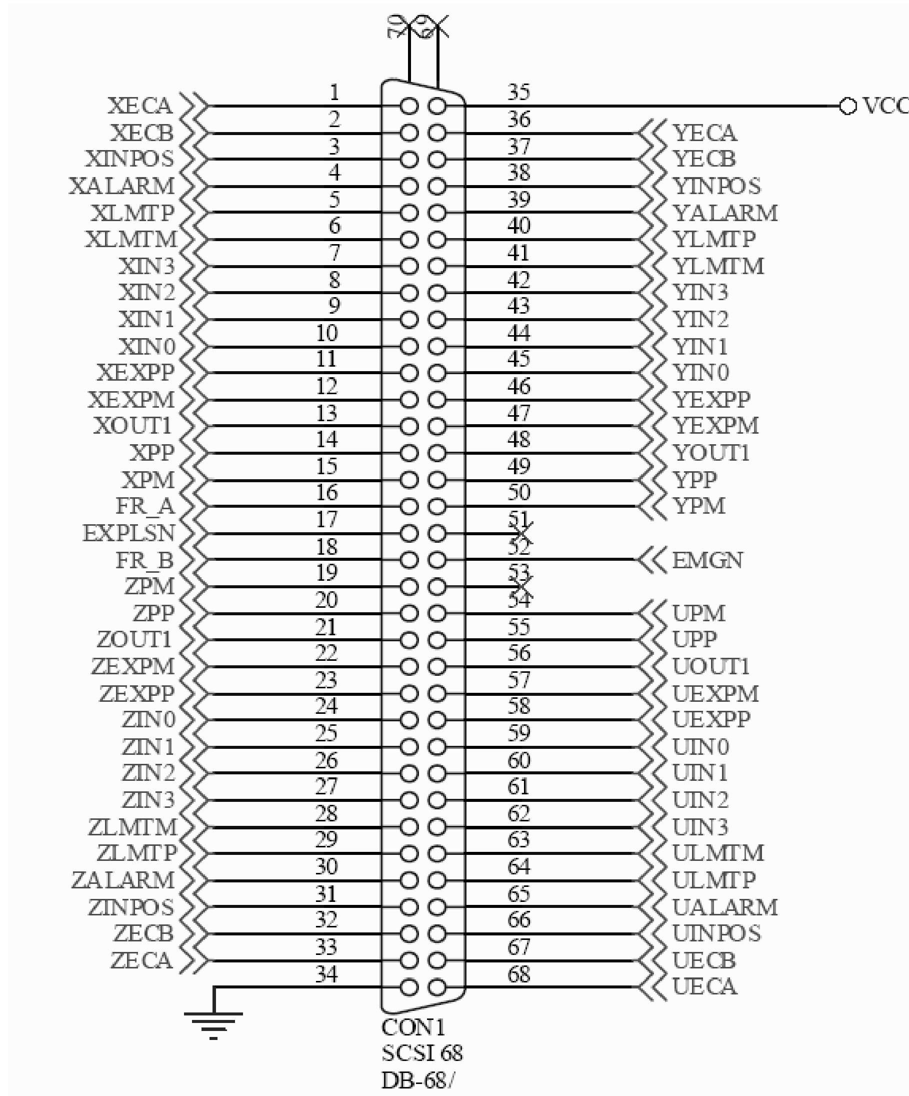


Fig. 2.1 DN-8468 CON1 連接線腳位圖

Table 2.1 DN-8468 CON1 連接線腳位說明 1

Pin name	Pin number	Description
XECA	1	Encoder A-phase signal for X axis
YECA	36	Encoder A-phase signal for Y axis
ZECA	33	Encoder A-phase signal for Z axis
UECA	68	Encoder A-phase signal for U axis
XECB	2	Encoder B-Phase signal for X axis
YECB	37	Encoder B-Phase signal for Y axis
ZECB	32	Encoder B-Phase signal for Z axis
UECB	67	Encoder B-Phase signal for U axis
XINPOS	3	In-position signal for X axis
YINPOS	38	In-position signal for Y axis
ZINPOS	31	In-position signal for Z axis
UINPOS	66	In-position signal for U axis
XALARM	4	Alarm signal for X axis
YALARM	39	Alarm signal for Y axis
ZALARM	30	Alarm signal for Z axis
UALARM	65	Alarm signal for U axis
XLMTP	5	Limit switch input signal (+) for X axis
YLMTP	40	Limit switch input signal (+) for Y axis
ZLMTP	29	Limit switch input signal (+) for Z axis
ULMTP	64	Limit switch input signal (+) for U axis
XLMTM	6	Limit switch input signal (-) for X axis
YLMTM	41	Limit switch input signal (-) for Y axis
ZLMTM	28	Limit switch input signal (-) for Z axis
ULMTM	63	Limit switch input signal (-) for U axis
XIN3	7	Input 3 signal for X axis
YIN3	42	Input 3 signal for Y axis
ZIN3	27	Input 3 signal for Z axis
UIN3	62	Input 3 signal for U axis
XIN2	8	Input 2 signal for X axis
XIN2	43	Input 2 signal for Y axis
XIN2	26	Input 2 signal for Z axis
XIN2	61	Input 2 signal for U axis
XIN1	9	Input 1 signal for X axis
YIN1	44	Input 1 signal for Y axis
ZIN1	25	Input 1 signal for Z axis
UIN1	60	Input 1 signal for U axis
XIN0	10	Input 0 signal for X axis
YIN0	45	Input 0 signal for Y axis
ZIN0	24	Input 0 signal for Z axis
UIN0	59	Input 0 signal for U axis

Table 2.2 DN-8468 CON1 連接線腳位說明 2

Pin name	Pin number	Description
XEXPP	11	EXT pulsar input signal (+) for X axis
YEXPP	46	EXT pulsar input signal (+) for Y axis
ZEXPP	23	EXT pulsar input signal (+) for Z axis
UEXPP	58	EXT pulsar input signal (+) for U axis
XEXPM	12	EXT pulsar input signal (-) for X axis
YEXPM	47	EXT pulsar input signal (-) for Y axis
ZEXPM	22	EXT pulsar input signal (-) for Z axis
UEXPM	57	EXT pulsar input signal (-) for U axis
XDRIVE	13	Driver enable signal for X axis
YDRIVE	48	Driver enable signal for Y axis
ZDRIVE	21	Driver enable signal for Z axis
UDRIVE	56	Driver enable signal for U axis
XPP	14	Driving pulsar signal (+) for X axis
YPP	49	Driving pulsar signal (+) for Y axis
ZPP	20	Driving pulsar signal (+) for Z axis
UPP	55	Driving pulsar signal (+) for U axis
XPM	15	Driving pulsar signal (+) for X axis
YPM	50	Driving pulsar signal (+) for Y axis
ZPM	19	Driving pulsar signal (+) for Z axis
UPM	54	Driving pulsar signal (+) for U axis
FR_A	16	FRnet A
NC	51	Reserved
FR_B	18	FRnet B
NC	53	Reserved
EXPLSN1	17	EXT pulse input signal for interpolation
EMGN1	52	Emergency stop input signal
GND	34	Ground
VCC	35	Module power (+5V)

■ **CON2~5　各軸（X、Y、Z、U）之控制接點【Pulse 輸出（±P/±N）; Encoder 輸入（A±/B±/Z±）】及 I/O 信號接點【INP、ALARM、Home（ORG）、Limit、EXP、IN3 等】**

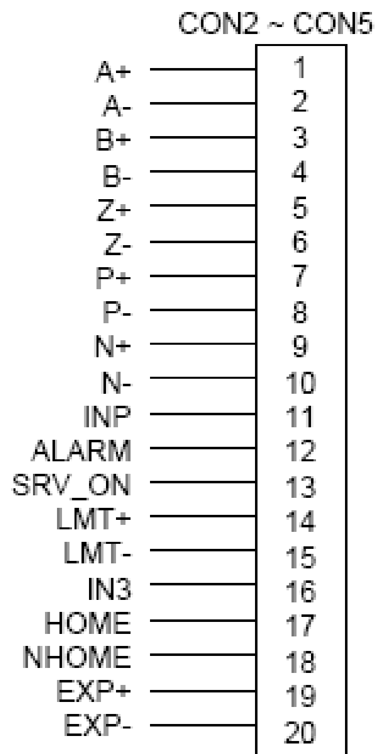


Fig. 2.2　Pin definition for CON2 ~ CON5

Table　2.3 CON2 ~ CON5 Signal Connection

Name	Number	Description
A+	1	Encoder A-Phase (+)
A-	2	Encoder A-Phase (-)
B+	3	Encoder B-Phase (+)
B-	4	Encoder B-Phase (-)
Z+	5	Encoder Z-Phase (+)
Z-	6	Encoder Z-Phase (-)
P+	7	Positive Direction Pulse Output(+)
P-	8	Positive Direction Pulse Output(-)
N+	9	Negative Direction Pulse Output(+)
N-	10	Negative Direction Pulse Output(-)
INP	11	Servo In Position
ALARM	12	Servo Alarm
SRV_ON	13	Servo On
LMT+	14	END Limit Signal (EL+)
LMT-	15	END Limit Signal (EL-)
IN3	16	Input Signal (IN3)
HOME	17	Home Sensor Input Signal
NHOME	18	Near Home Sensor Input Signal
EXP+	19	EXT Positive Direction Pulse (+)
EXP-	20	EXT Negative Direction Pulse (-)

■ **CON6 FRnet 接點：為串列分散式 I/O 控制點，其最大傳輸速率為 1M Hz，且為主動式之固定時間更新 I/O 點資料，每一週期時間為：0.76 Ms；最多可串接 128DI 及 128DO。**

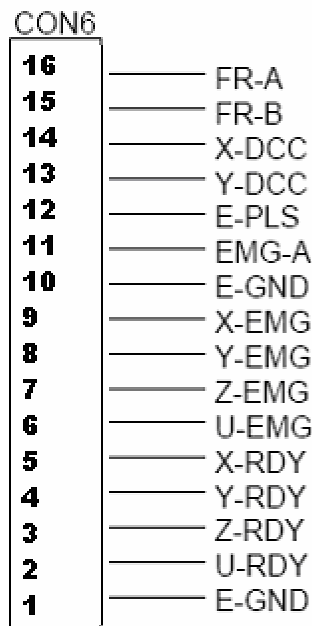


Fig. 2-3 Pin definition for CON6

Table 2-4 CON6 Signal Connection

Name	Description
FR-A	FRnet port A
FR-B	FRnet port B
X-DCC	Deviation Counter Clear for X axis
Y-DCC	Deviation Counter Clear for Y axis
E-PLS	EXT pulse signal
EMG-A	EMG input signal for all axes
E-GND	EXT power ground
X-EMG	EMG input signal for X axis
Y-EMG	EMG input signal for Y axis
Z-EMG	EMG input signal for Z axis
U-EMG	EMG input signal for U axis
X-RDY	Ready input signal for X axis
Y-RDY	Ready input signal for Y axis
Z-RDY	Ready input signal for Z axis
U-RDY	Ready input signal for U axis

如運動控制內建 FR_Net 分散式 DIO 控制器，可以外接高速 FR_Net 模組，128 DI/128 DO 接線端子。

■ **TB2 參考下列腳位圖**

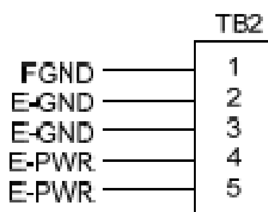


Fig. 2.4 Pin definition for TB2

Table 2.5 TB2 Signal Connection

Name	Description
E-PWR	EXT power supply +24V
E-GND	EXT power ground
FGND	Frame ground

► Note: Don't reverse connect signals with E_PWR and E_GND. Serious damage to your motion card and motion controller might be happen

■ RJ1 FRnet 接點,參考下列腳位圖

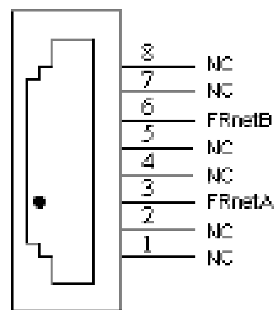


Fig. 2.5 Pin definition for RJ1

Table 2.6 RJ1

Pin name	Description
FRnetA	FRnet port A
FRnetB	FRnet port B
NC	No connection

Note: Don't connect NC (not connected) signals. Connecting these signals could cause permanent damage to your motion controller.

2.2.2 功能選擇(跳線設定)

■ **JP7**

Jumper 7 控制緊急停止輸入由外部提供或直接與GND點連接，1-2pin 短路須經由外部腳位接GND，2-3pin 短路為內部電路直接接GND

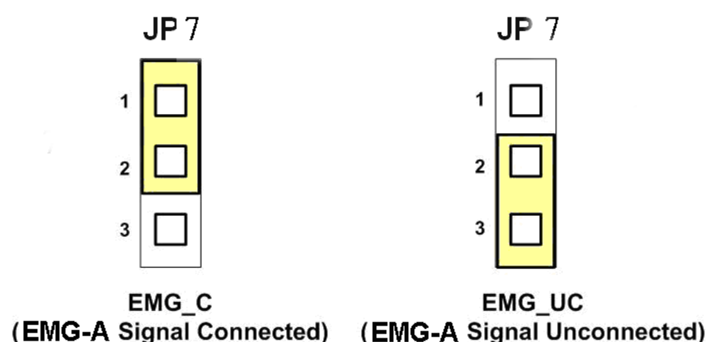


Fig. 2.5 Jumper 7 設定

■ **JP8/9, JP10/11, JP12/13, JP14/15**

Jumper 8、9 控制X軸(CON1) XPP、XPM訊號模式，2-3pin 短路為差動輸出 (Differential)；1-2pin 短路為開集極輸出(Open Collector)，同理其他各軸設定Y(JP10/11)、Z(JP12/13)、U(JP14/15)亦相同，如下圖範例

注意: 開集極輸出(Open Collector)，P+ (N+)和 EXT_5V 短路，可供外部使用 (參考 Fig 2.10)。

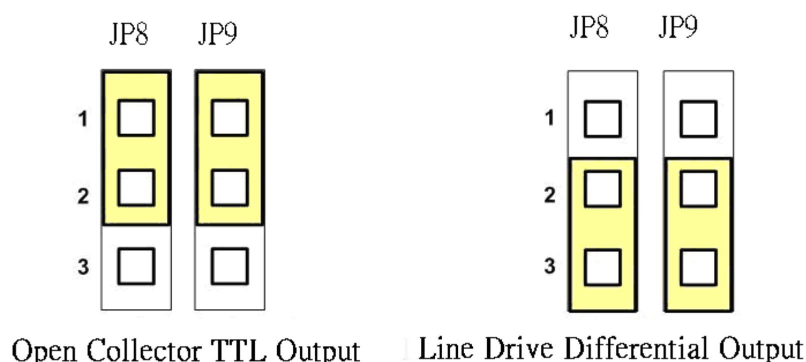


Fig. 2.6 Jumper 8, 9 設定

■ EMG SW

EMG SW 是將伺服馬達所上提供給EMG Stop訊號引出供給客戶配接使用，並非軸卡上之功能，客戶可以撥動EMG SW來選擇將此訊號配接於自行設計的安全開關連接使用或選擇不使用，若選擇不使用則是將此訊號直接短路到端子台的GND，若選擇使用則客戶可以將CON6上的EMG當成配接點來結合使用，請參考下圖：

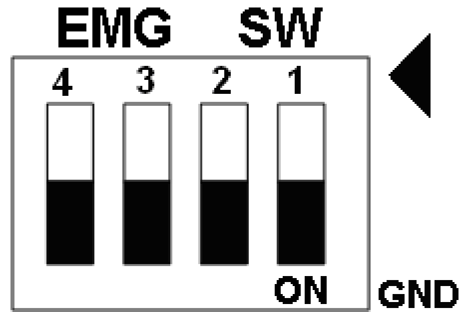


Fig. 2.7 EMG SW 設定爲直接內部接 GND (預設值)

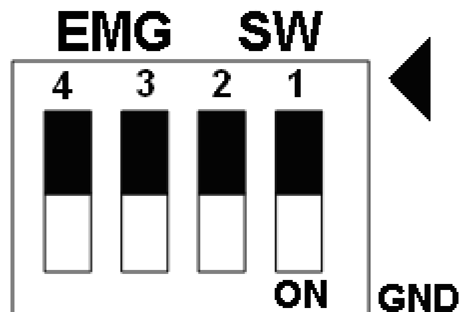


Fig. 2.8 EMG SW 設定爲使用者自行配接點.

2.3 I/O 輸出入介面

2.3.1 脈波輸出介面

差動脈波輸出接線

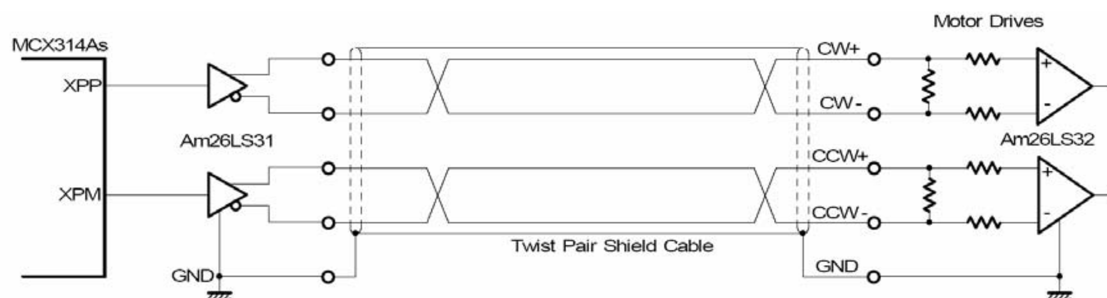


Fig. 2.8 差動脈波輸出接線

開集極輸出

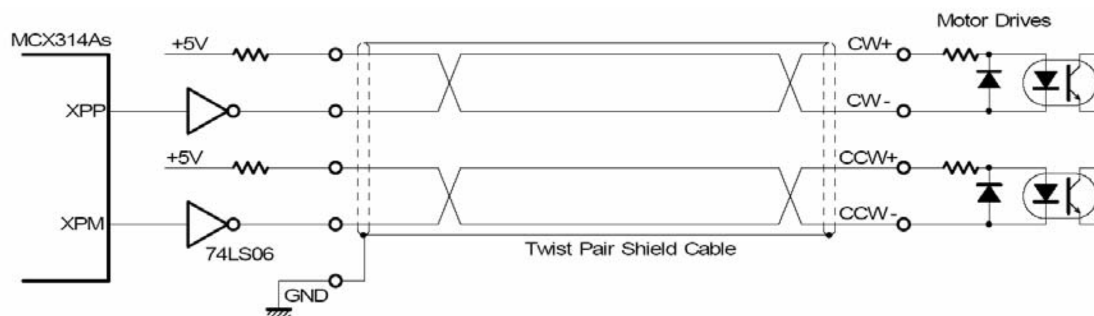


Fig. 2.9 開集極輸出

脈波信號接線範例

I8094 脈波輸出命令,可以使用 **CW/CCW** 模式或用 **PULSE/DIR** 模式。利用 **JP2** 和 **JP3** 去選擇差動或開集極的接法。

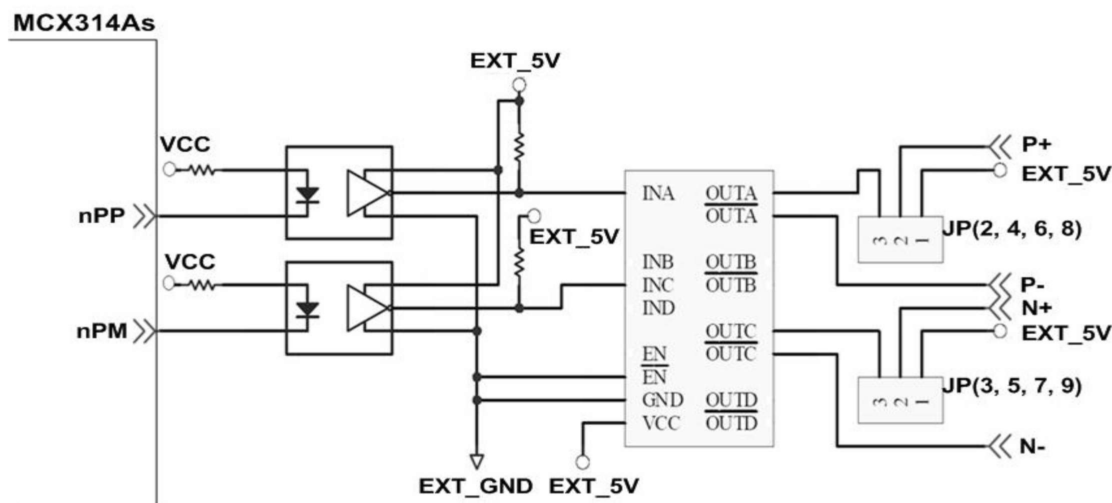


Fig. 2.10 脈波信號接線範例

2.3.2 極限開關接線(Connection for Limit switch Signal)

使用極限開關去防止機械過動作，設計者能透過本手冊的函式庫，去設定硬體極限開關的動作等級。下面圖例，極限開關信號的接續迴路是為了要隔離雜訊源。

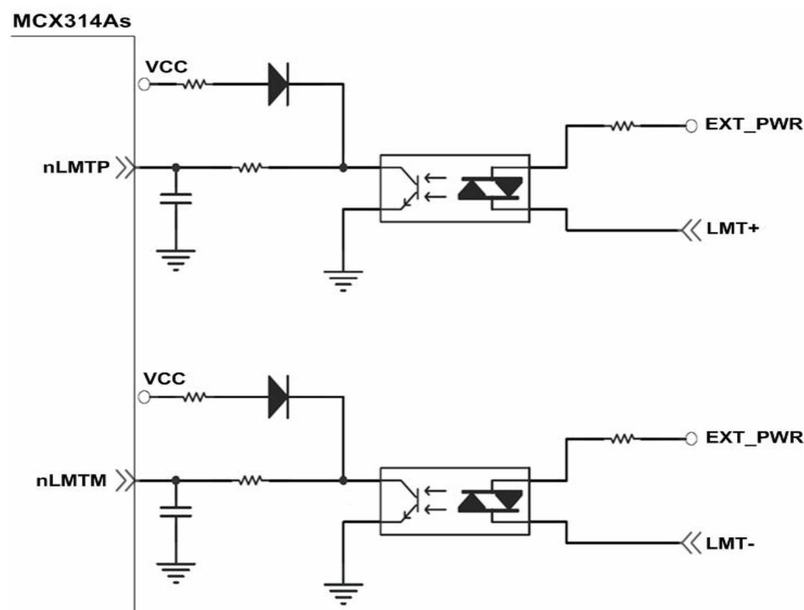


Fig. 2.11 極限開關接線範例

2.3.3 一般 DI 輸入接線(nINPOS,nALARM)

nINPOS 輸入信號，是伺服驅動器 **in-Position** 的檢查信號。設計者能透過本手冊的函式庫去 **enable/disable** 這個信號。

nALARM 輸入信號，是伺服驅動器警報輸出信號，當 **I8094** 收到這個信號可以停止輸出脈波。設計者能透過本手冊的函式庫去 **enable/disable** 這個信號。

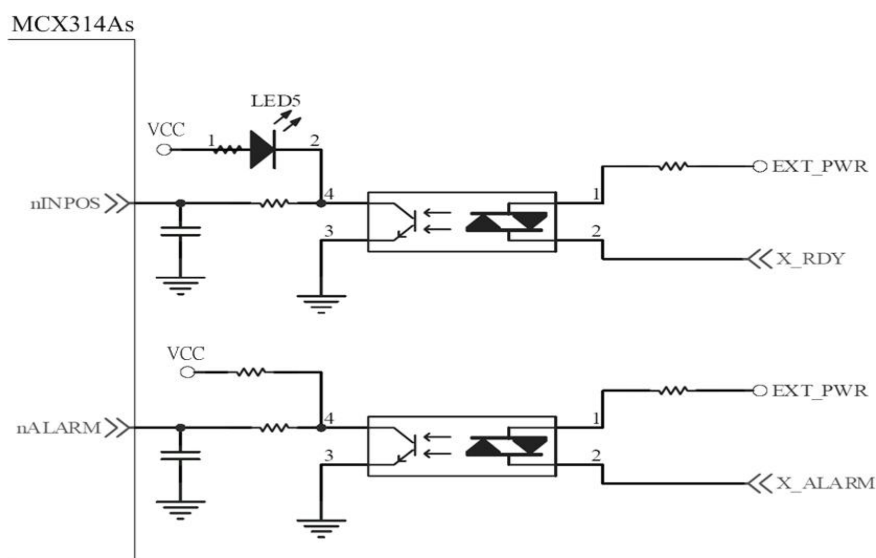


Fig. 2.12 一般 **DI** 輸入接線範例

2.3.4 Encoder 輸入接線(Encoder Signals)

下圖是一個 Encoder 輸入接線範例,是用差動輸入信號接法。要接 Encoder 輸入時,A 相請連接 A+、A-,B 相請連接 B+、B-,經過高速光偶合 IC 就直接連到運動控制晶片。

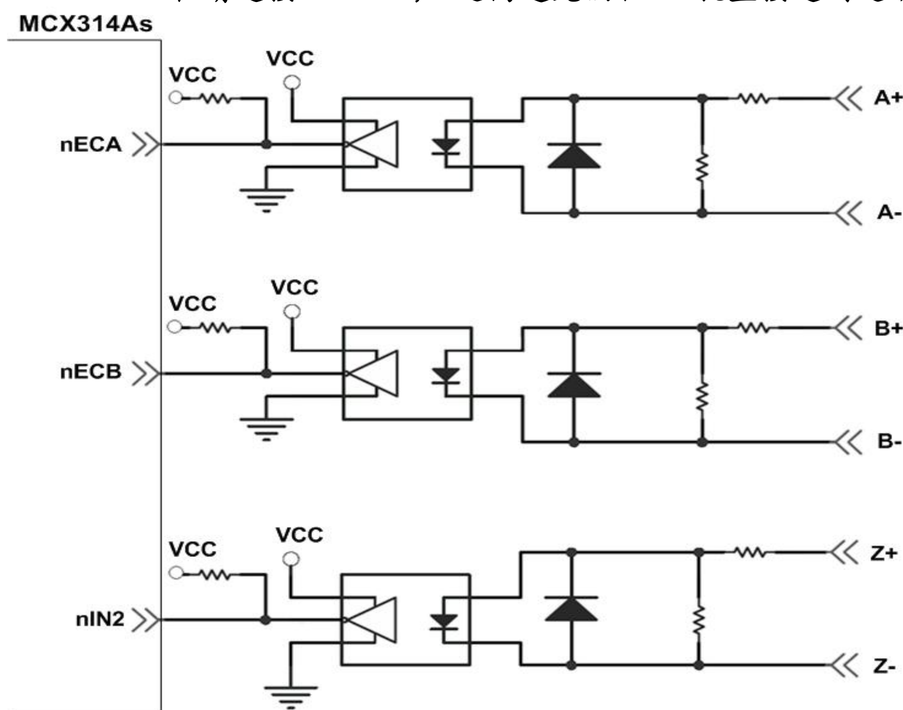


Fig. 2.13 Encoder 接線範例

2.3.5 外部輸入脈波接線(external pulse signal)

下圖是一個外部輸入脈波接線範例,經過高速光偶合 IC 就直接連到運動控制晶片。

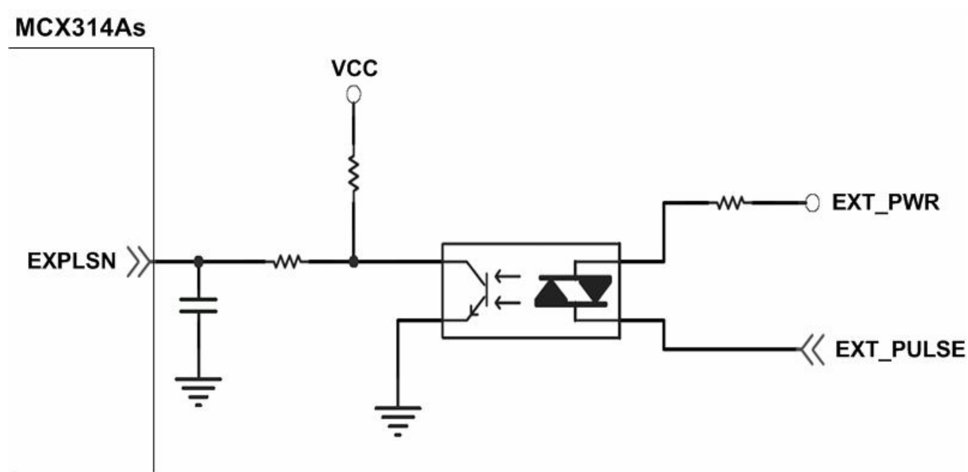


Fig. 2.14 外部輸入脈波接線範例

2.3.6 緊急停止輸入接線(emergency stop signal)

下圖是一個緊急停止輸入接線範例，當緊急停止輸入被按下時，所有軸會立即停止輸出，錯誤旗標將設為 **1**，這信號經過高速光偶合 **IC** 就直接連到運動控制晶片。

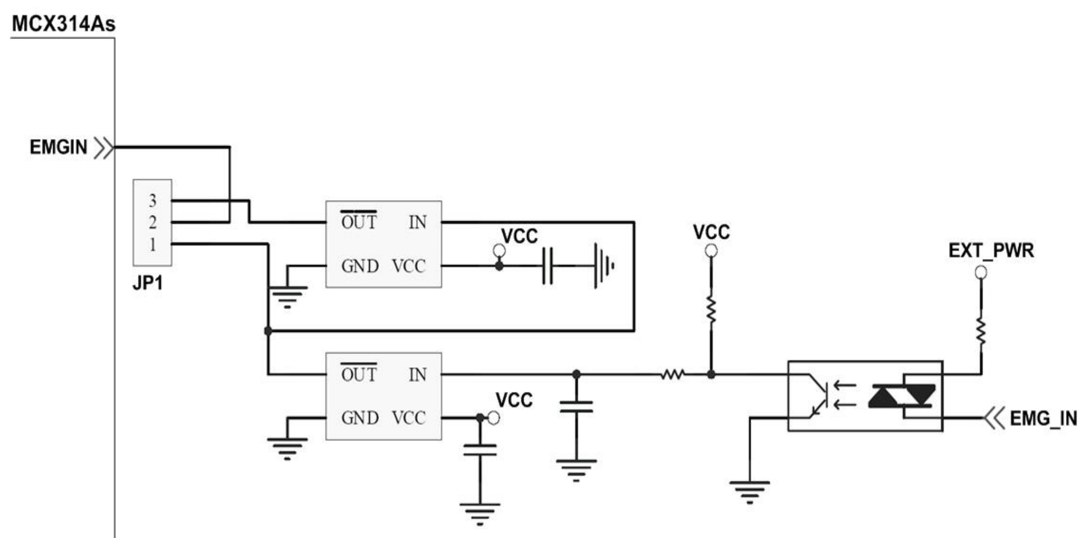


Fig. 2.15 緊急停止輸入接線範例

2.3.7 外部信號輸入接線(EXP+,EXP-)

本信號用於外部輸入驅動，下圖是外部信號 **+/-** 輸入接線範例，這輸入功能可用 **5.1** 章節中的固定脈波驅動、連續脈波驅動、手輪脈波驅動三個功能可以應用。

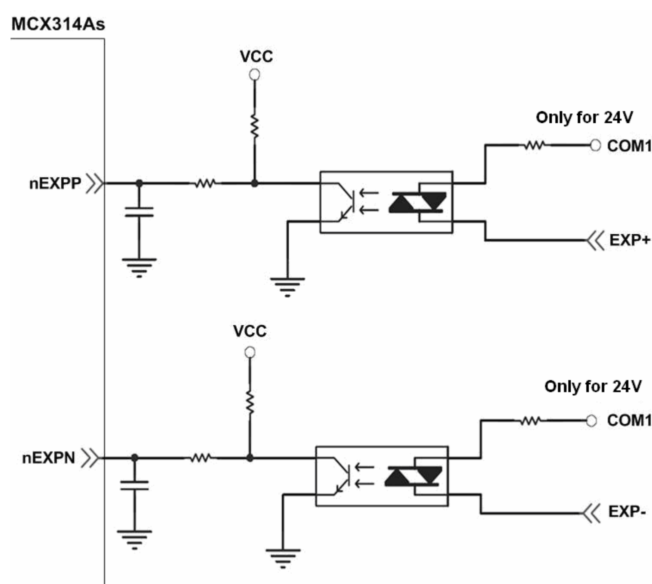


Fig. 2.16 外部信號 **+/-** 輸入接線範例

2.3.8 Servo On/Off 信號輸出接線(ENABLE)

下圖是 **Servo On/Off** 信號輸出接線範例，這輸出功能用於使每軸伺服馬達伺服啟動/關閉。

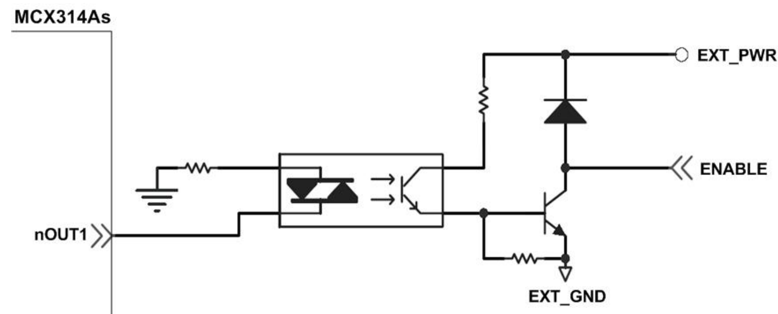


Fig. 2.17 Servo On/Off 信號輸出接線

2.4 接線範例

我們實際示範接 **MITSUBISH MR-J2S AC** 伺服馬達，連接到 **DN-8468** 的接線腳位圖

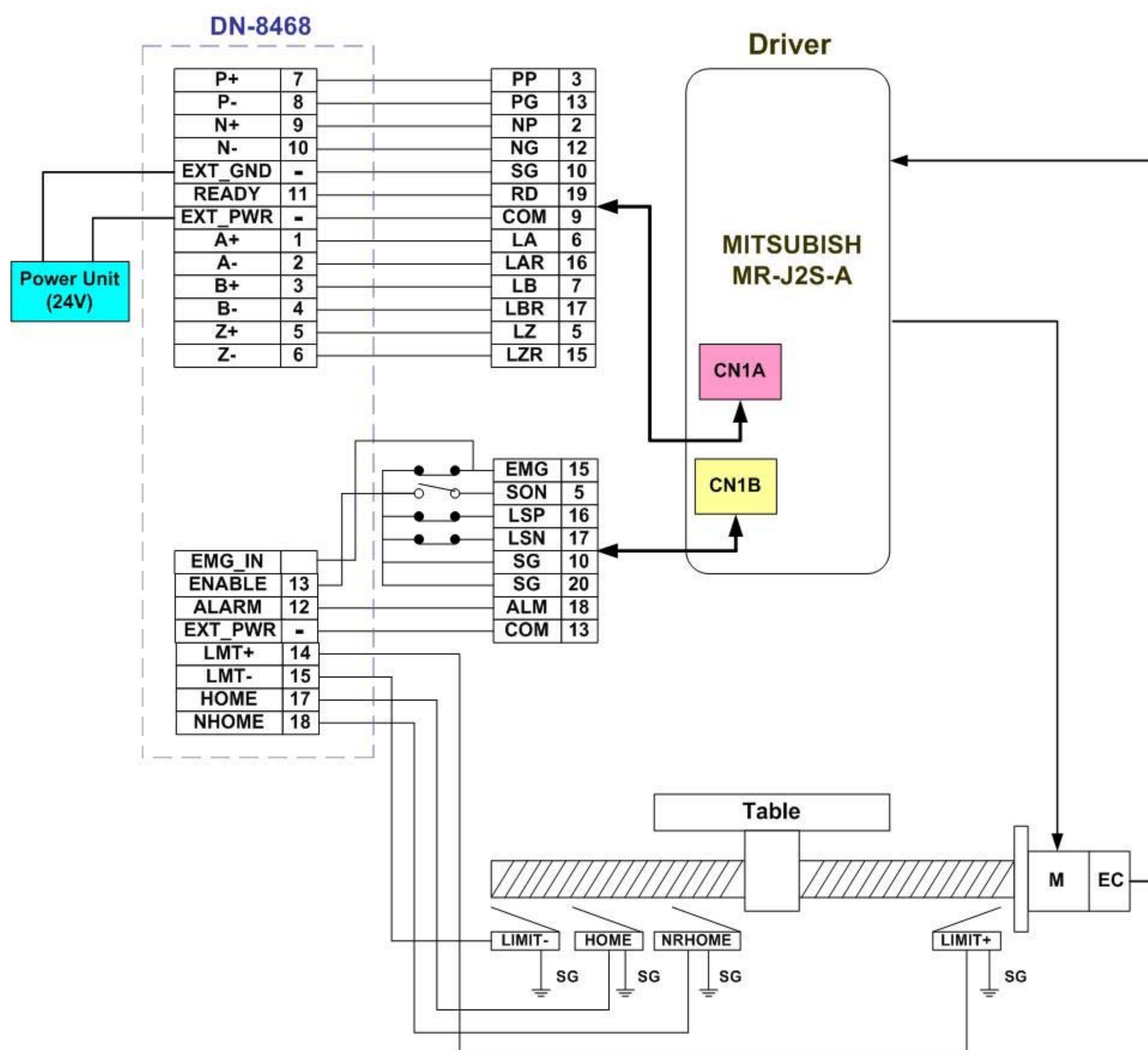
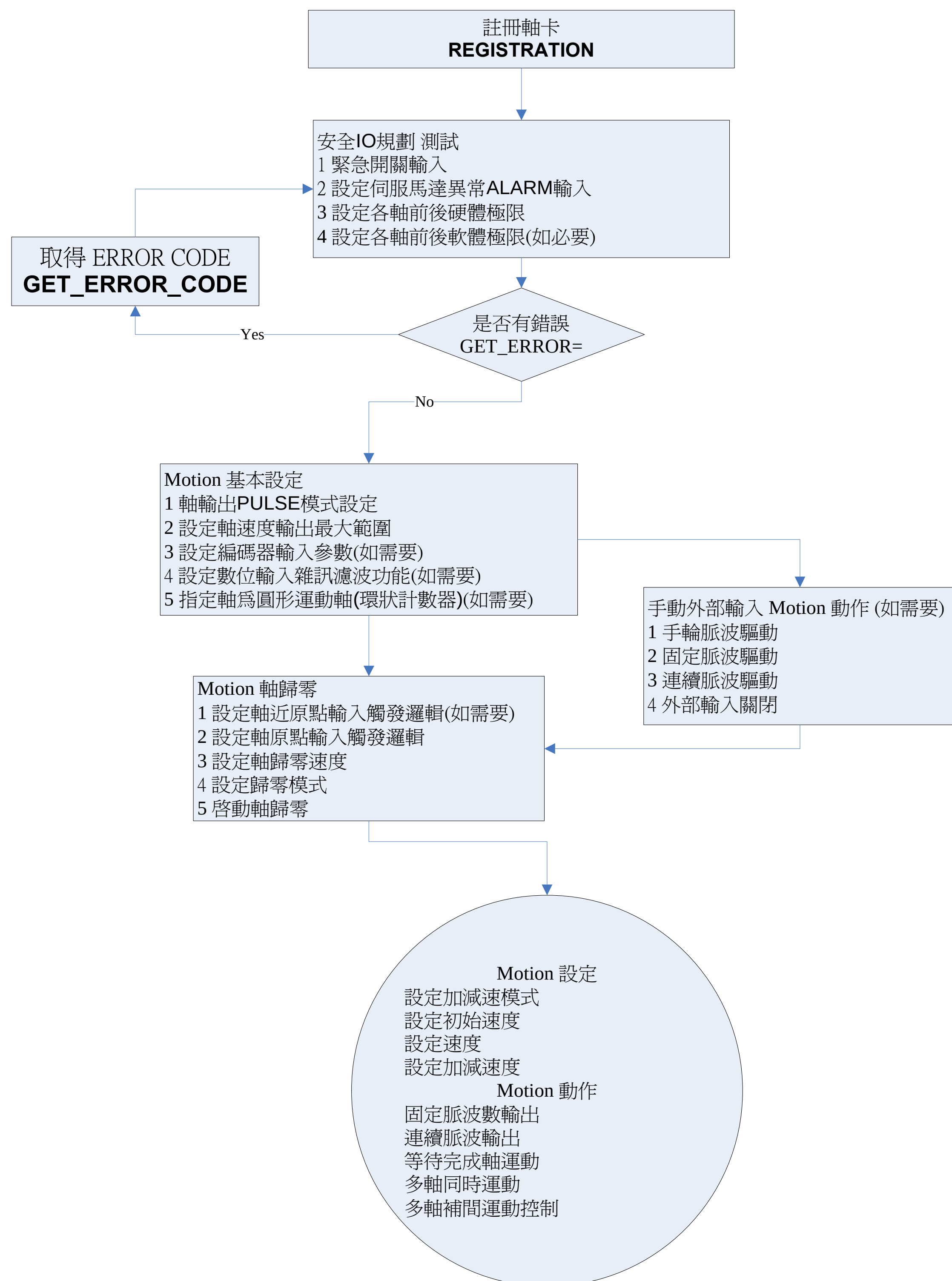


Fig. 2.18 MR-J2S AC 伺服馬達，連接到 **DN-8468** 的接線腳位圖

3 i8094 軟體開發程序

3.1 軟體開發測試程序概觀

詳細請參考: demo_start 範例



3.1.1 註冊軸卡

每一軸卡要使用之前一定要先註冊，才能下其他指令，否則會產生錯誤。

i8094MF_REGISTRATION()詳情請參考 **"i8094** 運動控制模組使用手冊 **" pdf 2.2**。

3.2 安全 IO 規劃(會使 Motion 不動作原因)

3.2.1 緊急開關輸入

緊急開關，是為因應緊急狀況，讓使用者在緊急時可以立即使**Motion** 動作停止，以保護人機安全。

如果您不用緊急開關，在 **1.2.3** 的**JP1**接為**2-3pin**。

如果您要使用緊急開關，在 **1.2.3** 的**JP1**接為**1-2pin**，**EMG_IN** 請連到常閉型**(N.C.)**開關，並將開關安裝到適當位置。

3.2.2 設定伺服馬達異常 ALARM 輸入參數

是為因應伺服馬達**ALARM**發生時輸入，讓使用者可以判斷及處理，您可以選擇使用與否，與適當觸發邏輯。詳情請參考 **"I8094**運動控制模組使用手冊 **" pdf 2.13**
i8094MF_SET_ALARM()

3.2.3 設定各軸前後硬體極限

在一般機構設計時，為保護機構安全，會在機構的安全行程內設置前後硬體極限開關，讓使用者可以避免超出行程，如碰觸到前後硬體極限開關**I8094**會自動停止，您可以選擇使用適當觸發邏輯。詳情請參考 **"I8094**運動控制模組使用手冊 **" pdf 2.6**
i8094MF_SET_HLMT () 功能

3.2.4 設定各軸前後軟體極限

在一般機構設計時，為保護機構安全，會在機構的安全行程內設置前後硬體極限開關外，可以再加軟體極限，讓使用者可以提早避免超出行程，或免用硬體極限，如碰觸到前後軟體極限**I8094**會自動停止，您可以選擇使用與否，與設定位置。詳情請參考 **"I8094**運動控制模組使用手冊 **" pdf 2.10**
i8094MF_SET_SLMT ()，與**i8094MF_CLEAR_SLMT()** 功能

3.3 檢查是否有錯誤(GET_ERROR)

檢查是否有錯誤，如有再GET_ERROR_CODE 取得 ERROR_CODE並查相關原因，相關處理檢查，及正確設定詳情請參考 “I8094運動控制模組使用手冊 ”pdf 3.6
也可以利用“I8094運動控制模組使用手冊 ”pdf 3.5 讀取目前DI狀態 i8094MF_GET_DI() 確認DI輸入是否正確

3.4 Motion 基本設定

Motion 基本設定主要是針對一般必要性設定分別如下:

1 軸輸出PULSE模式設定，Pulse/Dir、CW/CCW…

   i8094MF_SET_PULSE_MODE() (詳情請參考 I8094運動控制模組使用手冊 2.4)

2 設定軸速度輸出最大範圍，設定每一軸最高速度

   i8094MF_SET_MAX_V ()(詳情請參考 I8094運動控制模組使用手冊 2.5)

3 設定編碼器輸入參數(如需要)

   i8094MF_SET_ENCODER()(詳情請參考 I8094運動控制模組使用手冊 2.11)

4 設定數位輸入雜訊濾波功能(如需要)

   i8094MF_SET_FILTER()(詳情請參考 I8094運動控制模組使用手冊 2.15)

5 指定軸為圓形運動軸(環狀計數器)(如需要)

   i8094MF_VRING_ENABLE()(詳情請參考 I8094運動控制模組使用手冊 2.16)

3.5 Motion 動作測試(手動外部輸入)(如需要)

實際測試時可用手動驅動功能，做一些基本前後移動動作，確認DI信號是否正常，正負方向是否正確，以便做進一步線路及參數調整，主要有下列三種方法可以選其一運用:

1 手輪脈波驅動: 用**A/B**相手輪(手動脈波產生器，如附圖)做為前後之控制。

i8094MF_EXD_MP()(詳情請參考 **I8094**運動控制模組使用手冊 **2.18.1)**



2 固定脈波驅動: 利用兩按鈕開關，可設定每按一下走幾步(**Pulse**)，一按鈕控制**Motion**前進，另一按鈕控制後退。

i8094MF_EXD_FP()(詳情請參考 **I8094**運動控制模組使用手冊 **2.18.2)**

3 連續脈波驅動: 利用兩按鈕開關，可設定**Pulse**輸出速度(**Hz**)按下輸出，放開即停止，一按鈕控制**Motion**前進，另一按鈕控制後退。

i8094MF_EXD_CP ()(詳情請參考 **I8094**運動控制模組使用手冊 **2.18.3)**

4 外部輸入關閉: 使用完上述三項功能，必須用此指令，將它關閉。

i8094MF_EXD_DISABLE() (詳情請參考 **I8094**運動控制模組使用手冊 **2.18.4)**

3.6 軸歸零

I8094 提供自動歸零功能，只要經適當設定後，即可下指令自動執行，主要步驟如下:

- 以高速尋找近原點開關
- 以歸零速度尋找原點開關
- 以歸零速度尋找伺服馬達 Z 相信號
- 以高速運動到補正值(Offset)位置(程式原點)

設定時，其中步驟可以選擇不執行，以符合客戶實際需求動作，執行時完全自動執行，節省CPU資源，及程式設計。

3.6.1 歸零設定

1 設定軸近原點輸入觸發邏輯(如需要)

i8094MF_SET_NHOME() (詳情請參考 I8094運動控制模組使用手冊 2.8)

2 設定軸原點輸入觸發邏輯

i8094MF_SET_HOME_EDGE() (詳情請參考 I8094運動控制模組使用手冊 2.9)

3 設定軸歸零速度

設定歸零速度值 **i8094MF_SET_HV() (詳情請參考 I8094運動控制模組使用手冊 5.1)**

設定開始啟動速度 **i8094MF_SET_SV() (詳情請參考 I8094運動控制模組使用手冊 6.1.2)**

4 設定歸零模式

i8094MF_SET_HOME_MODE()(詳情請參考 I8094運動控制模組使用手冊 5.3)

3.6.2 執行歸零設定

1 啟動軸歸零

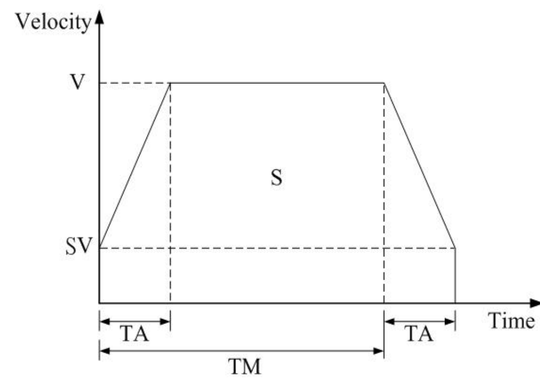
i8094MF_HOME _START()(詳情請參考 I8094 運動控制模組使用手冊 5.4)

2 等待完成歸零動作

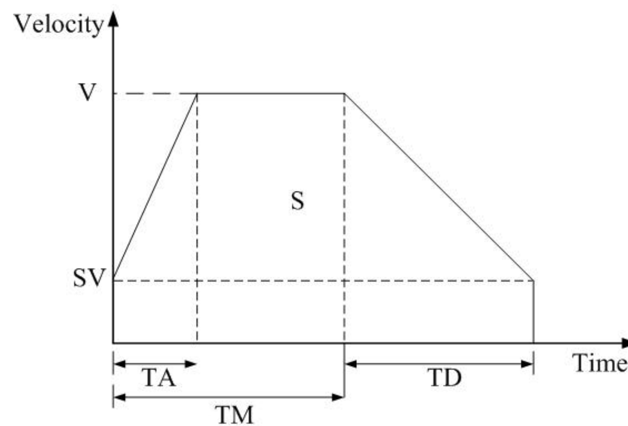
i8094 _HOME_WAIT()(詳情請參考 I8094 運動控制模組使用手冊 5.5)

3.7 Motion 基本運作

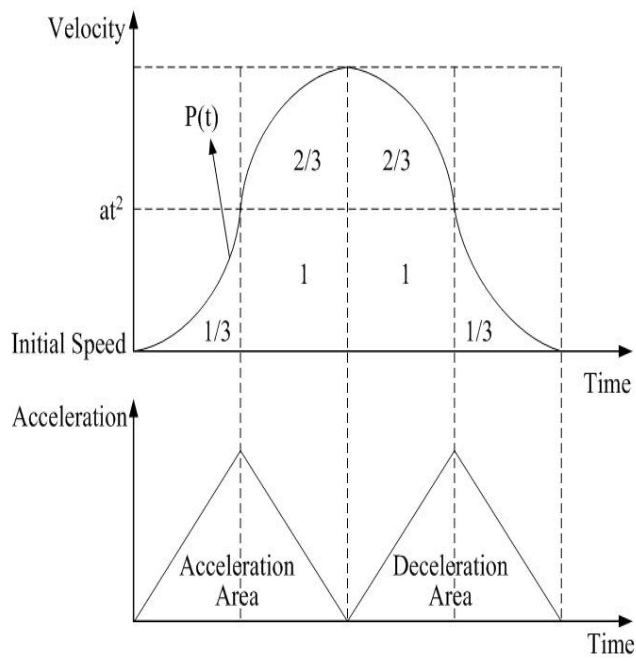
3.7.1 一般運動控制速度曲線分類



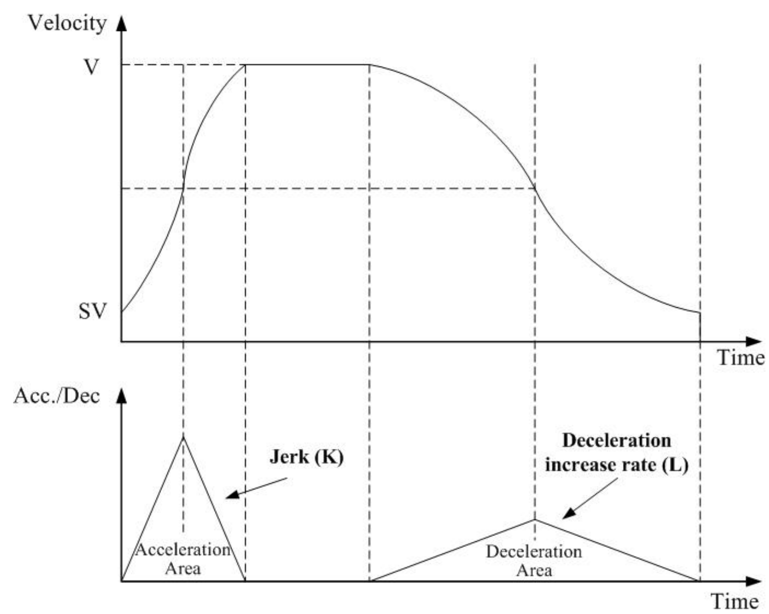
1 對稱 T 型運動控制速度曲線(如 SV 大於等於 V,將執行定速驅動)



2 非對稱 T 型運動控制速度曲線



3 對稱 S 型運動控制速度曲線



4 非對稱 S 型運動控制速度曲線

3.7.2 單軸 Motion 基本設定

1 設定加減速模式: 有四種速度模式設定。

0 → 對稱 **T** 曲線 **(SV、V、A、AO)**
1 → 對稱 **S** 曲線 **(SV、V、K、AO)**
2 → 非對稱 **T** 曲線 **(SV、V、A、D、AO)**
3 → 非對稱 **S** 曲線 **(SV、V、K、L、AO)**
i8094MF_NORMAL_SPEED()(詳情請參考 **I8094**運動控制模組使用手冊 **6.1.1)**

2 設定初始速度: 設定最低速度

i8094MF_SET_SV ()(詳情請參考 **I8094**運動控制模組使用手冊 **6.1.2)**

3 設定速度: 指定運動速度

i8094MF_SET_V ()(詳情請參考 **I8094**運動控制模組使用手冊 **6.1.3)**

4 設定加減速度: 指定運動時之加減速

i8094MF_ SET_A ()(詳情請參考 **I8094**運動控制模組使用手冊 **6.1.4)**

i8094MF_ SET_D ()(詳情請參考 **I8094**運動控制模組使用手冊 **6.1.5)**

3.7.3 單軸 Motion 基本動作

1 固定脈波數輸出: 執行單軸固定步數輸出。

i8094MF_FIXED_MOVE()(詳情請參考 **I8094**運動控制模組使用手冊 **6.1.9)**

2 連續脈波輸出: 執行單軸連續脈波輸出。

i8094MF_CONTIUNE_MOVE ()(詳情請參考 **I8094**運動控制模組使用手冊 **6.1.10)**

3 等待完成軸運動: 等待軸完成停止。

i8094MF_STOP_WAIT()(詳情請參考 **I8094** 運動控制模組使用手冊 **6.5.3)**

3.7.4 多軸補間(向量)Motion 基本設定

1 設定補間軸: 設定補間軸對象(哪幾軸要補間)。

i8094MF_AXIS_ASSIGN()(詳情請參考 I8094 運動控制模組使用手冊 6.2.1)

2 設定向量加減速模式: 設定向量加減速模式，共有如下12種模式

0 → 二軸(直線&弧&圓)固定向量速度 (VV)
1 → 二軸直線對稱 T 曲線 (VSV、VV、VA、VAO)
2 → 二軸直線對稱 S 曲線 (VSV、VV、VK、VAO)
3 → 二軸直線非對稱 T 曲線 (VSV、VV、VA、VD、VAO)
4 → 二軸直線非對稱 S 曲線 (VSV、VV、VK、VL、VAO)
5 → 二軸(弧&圓)對稱 T 曲線 (VSV、VV、VA、VAO)
6 → 二軸(弧&圓)非對稱 T 曲線 (VSV、VV、VA、VD、VAO)
7 → 三軸直線固定向量速度 (VV)
8 → 三軸直線對稱 T 曲線 (VSV、VV、VA、VAO)
9 → 三軸直線對稱 S 曲線 (VSV、VV、VK、VAO)
10 → 三軸直線非對稱 T 曲線 (VSV、VV、VA、VD、VAO)
11 → 三軸直線非對稱 S 曲線 (VSV、VV、VK、VL、VAO)

i8094MF_VECTOR_SPEED()(詳情請參考 I8094運動控制模組使用手冊 6.2.2)

2 設定向量初始速度: 設定軸之向量初始速度。

i8094MF_SET_VSV()(詳情請參考 I8094運動控制模組使用手冊 6.2.3)

3 設定向量速度: 設定軸之向量定速度。

i8094MF_SET_VV()(詳情請參考 I8094運動控制模組使用手冊 6.2.4)

4 設定向量加減速度: 設定軸之向量加減速度。

i8094MF_SET_VA()(詳情請參考 I8094運動控制模組使用手冊 6.2.5)

i8094MF_SET_VD()(詳情請參考 I8094運動控制模組使用手冊 6.2.6)

3.7.5 多軸補間 Motion 基本動作

1 二軸直線補間: 執行二軸直線補間。

i8094MF_LINE_2D()(詳情請參考 **I8094** 運動控制模組使用手冊 **6.2.10)**

2 三軸直線補間: 執行三軸直線補間。

i8094MF_LINE_3D()(詳情請參考 **I8094**運動控制模組使用手冊 **6.2.11)**

3 二軸圓弧補間: 執行二軸圓弧補間。

i8094MF_ARC_CW ()(詳情請參考 **I8094**運動控制模組使用手冊 **6.2.12)**

i8094MF_ARC_CCW ()(詳情請參考 **I8094**運動控制模組使用手冊 **6.2.12)**

4 二軸圓補間: 執行二軸圓補間。

i8094MF_ CIRCLE _CW ()(詳情請參考 **I8094**運動控制模組使用手冊 **6.2.13)**

i8094MF_ CIRCLE _CCW ()(詳情請參考 **I8094**運動控制模組使用手冊 **6.2.13)**

3.8 Motion 進階運動

1 二軸矩形連續補間: 執行二軸矩形補間。

i8094MF_RECTANGLE()(詳情請參考 **I8094** 運動控制模組使用手冊 **6.4.1)**

2 二軸直線連續補間:

二軸直線連續補間初始設定(對稱 T 曲線加減速)。

i8094MF_LINE_2D_INITIAL()(詳情請參考 **I8094** 運動控制模組使用手冊 **6.4.2)**

執行二軸直線連續補間。

i8094MF_LINE_2D_CONTINUE()(詳情請參考 **I8094** 運動控制模組使用手冊 **6.4.2)**

3 三軸直線連續補間:

三軸直線連續補間初始設定(對稱 T 曲線加減速)。

i8094MF_LINE_3D_INITIAL()(詳情請參考 **I8094** 運動控制模組使用手冊 **6.4.3)**

執行三軸直線連續補間。

i8094MF_LINE_3D_CONTINUE() (詳情請參考 **I8094** 運動控制模組使用手冊 **6.4.3)**

4 其他補間: 多點連續補間, 三軸螺旋運動,二軸比例運動 (詳情請參考 **I8094** 運動控制模組使用手冊 **6.4.4~6.4.7)**

3.9 Motion 同步運動

i8094 還提供許多同步運動功能,如比較 **EP,LATCH….**

(詳情請參考 **I8094** 運動控制模組使用手冊 **6.3)**

4 軟體快速上手

4.1 WinCon eVC++

4.1.1 確認相關檔案

請確認您有以下相關檔案:

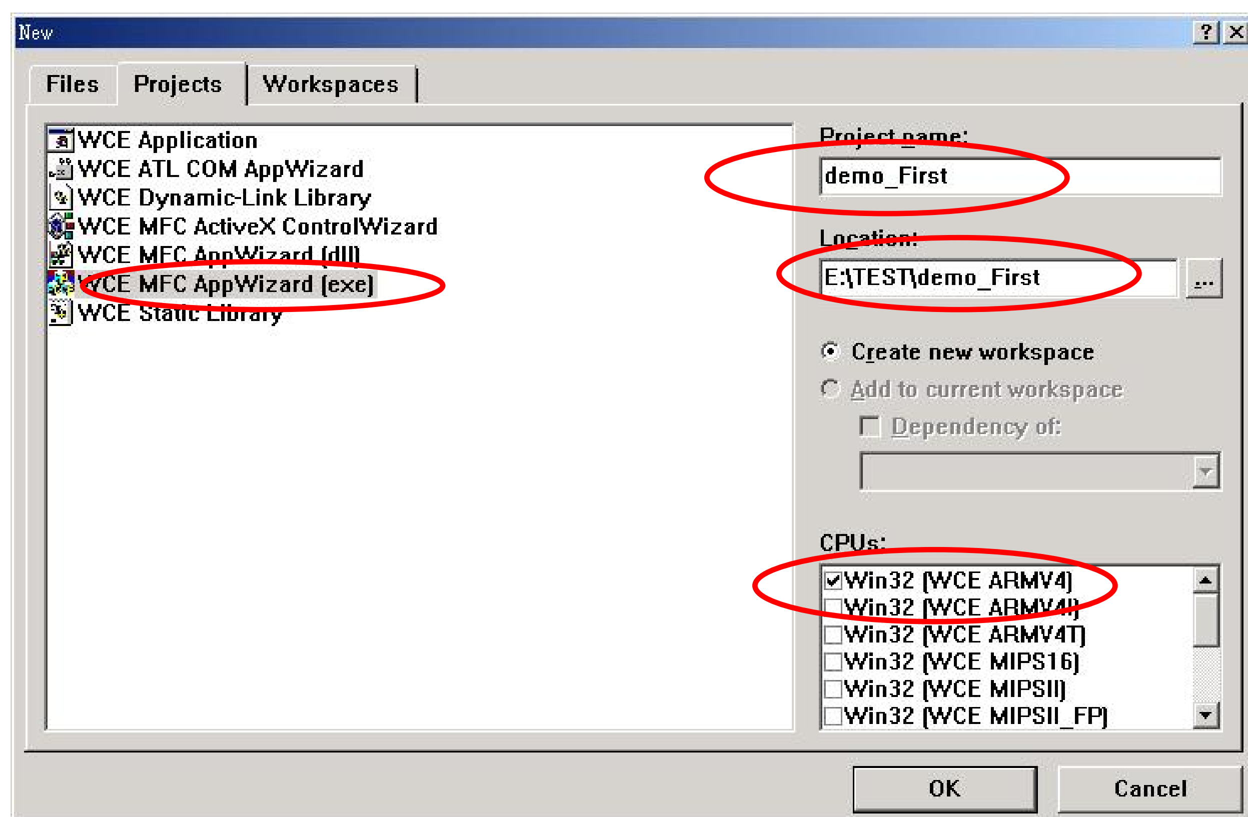
1. **I8094.lib**
2. **I8094.dll**
3. **I8094.h**

如您沒有,請找 **CD** 或到我們的網站下載最新版本資料

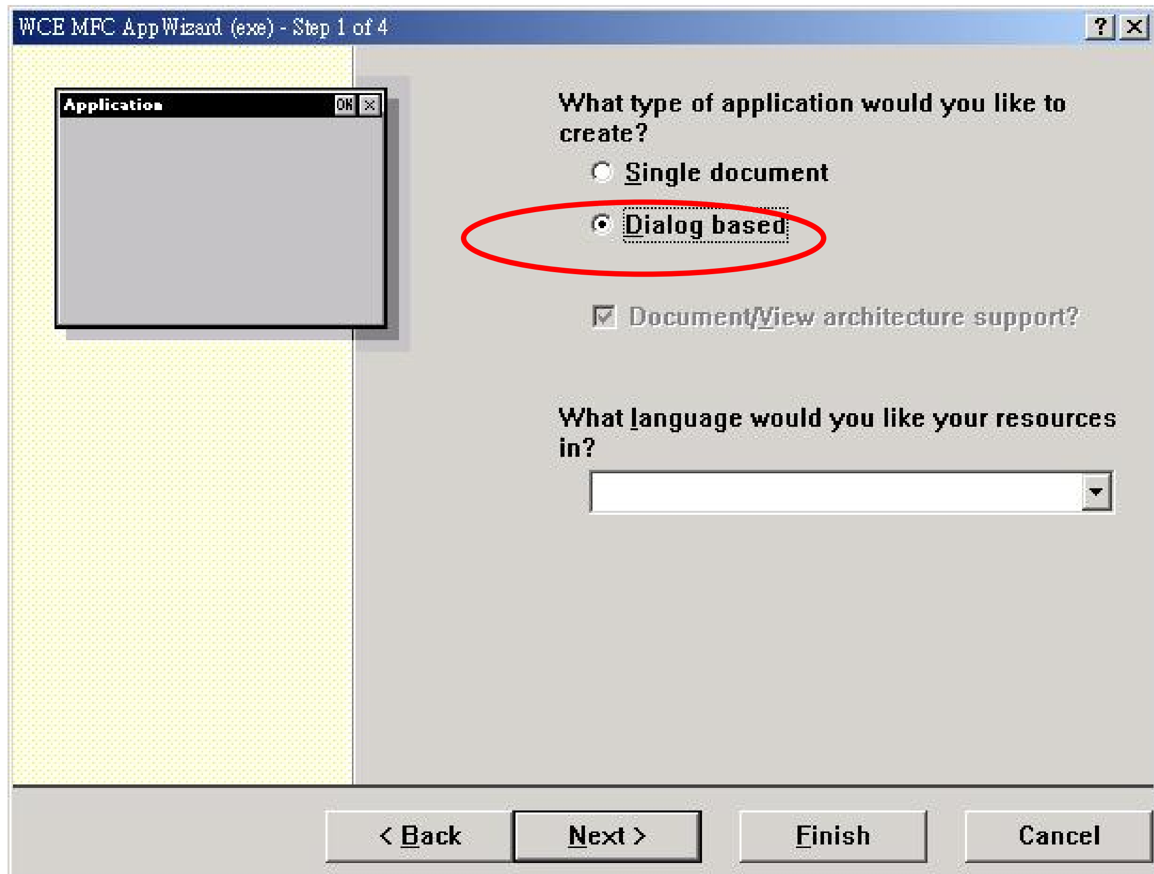
http://www.icpdas.com/download/download-list.htm

4.1.2 新增一 eVC++應用程式專案

請開啟 **eVC++ 4.0** 軟體。然後，請按滑鼠鍵**“File” -> “New”**來開啟新程式。在**“Projects“** 標籤，選擇 **“WCE MFC AppWizard (exe)”** 並且設定專案名稱為 **”Demo_First”**並在**“Location”**填入它的檔案路徑。然後，在中央處理器列表框中選擇 **“Win 32[WCE ARMV4]“** ，如果必要的話也一起勾選其他的選項。最後按滑鼠鍵 **”OK”** 。



選擇 **Dialog based** 按 **“NEXT”**



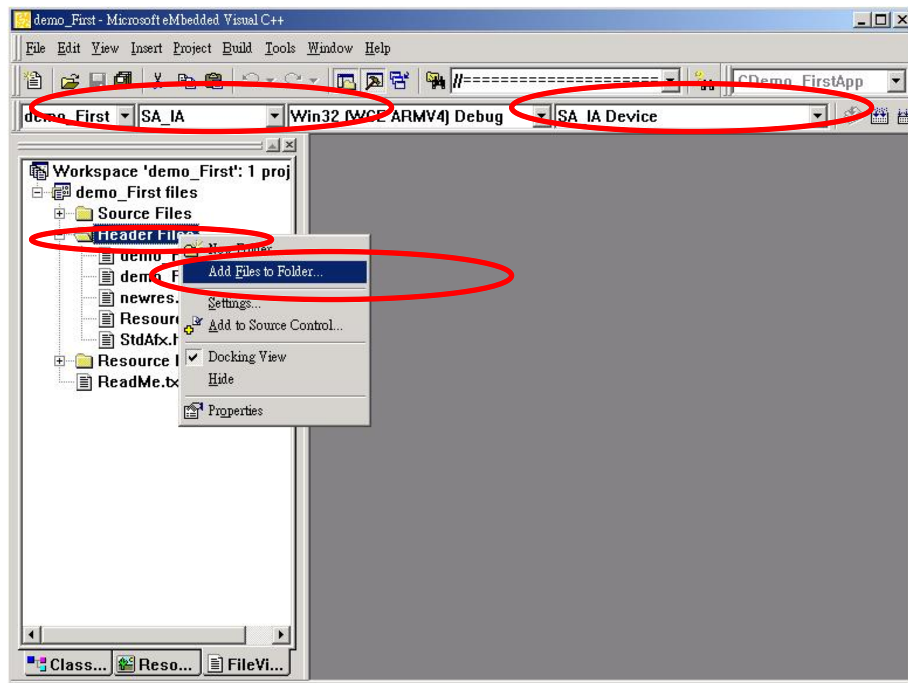
再按 **“Finish”**

即完成開一新專案

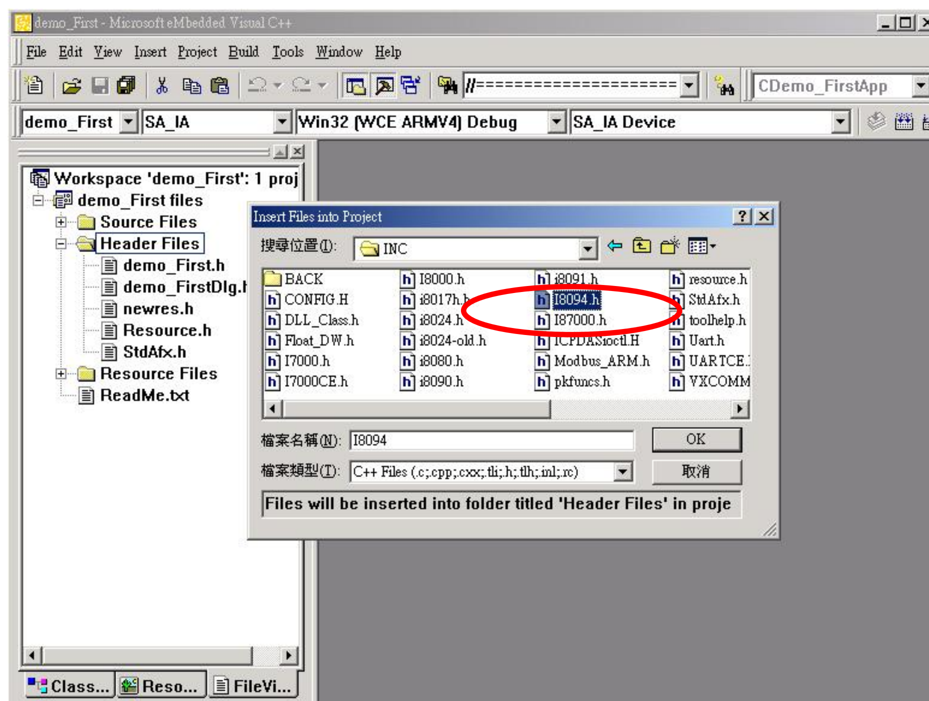
4.1.3 在 eVC++專案中加入 I8094.h

在專案的 **WorkSpace** 中加入 **i8094.h** 如下:

在 **Header Files** 按滑鼠右鍵，選 **Add Files to Folder….**



出現選檔對話框，找到並選擇 **I8094.h** 檔並按 **OK**



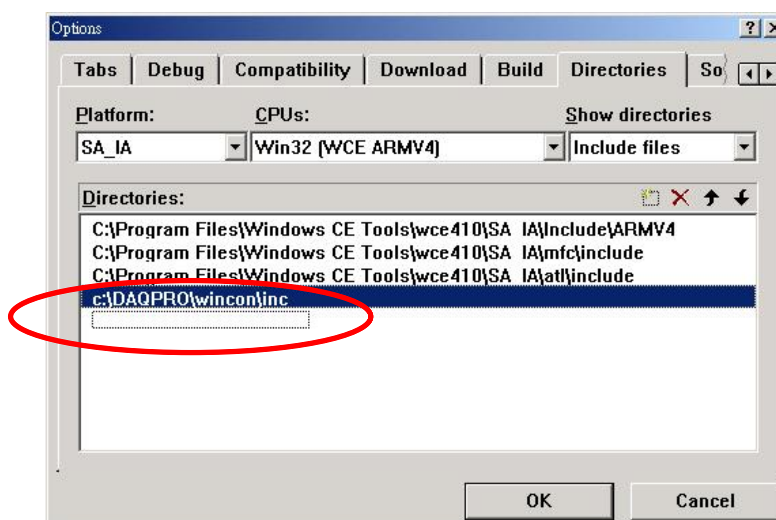
4.1.4 在 eVC++ 專案中加入參考路徑

A. 在“Tools” 工能表中開啟“Options” 對話框。

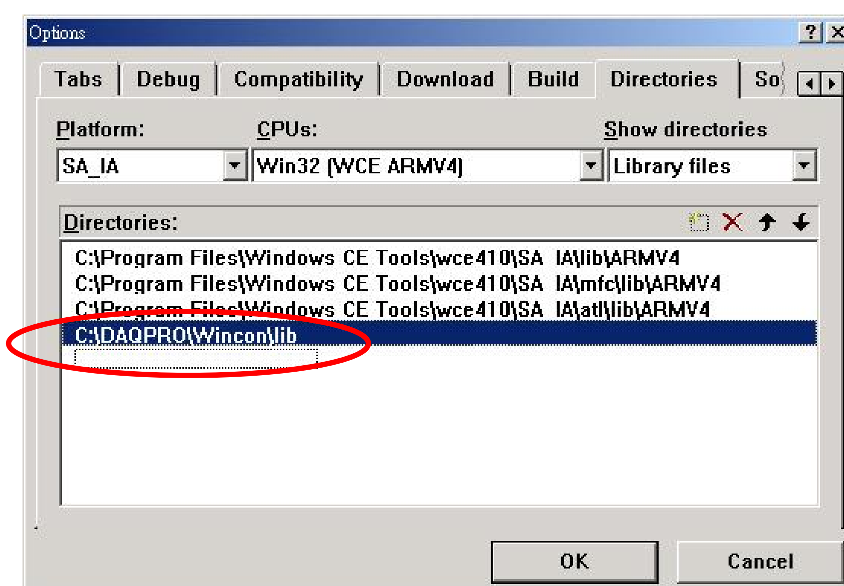
B. 選“D irectories“ 標籤，在 “Platform” 項目選擇 “SA_IA”， 在 “CPUs”項目選擇“Win32 [WCE ARMV4]”和在“include files”項目選擇“Show directories“。

C. 增加含括檔的路徑，在 “Directories” 下方空行處 (指出附近空的長方形)雙擊-按滑鼠鍵，如顯示在下列的圖片；請輸入包括用戶安裝驅動程式的檔案路徑。

D. 再來，於“Show directories”項目中選擇“Library files”。

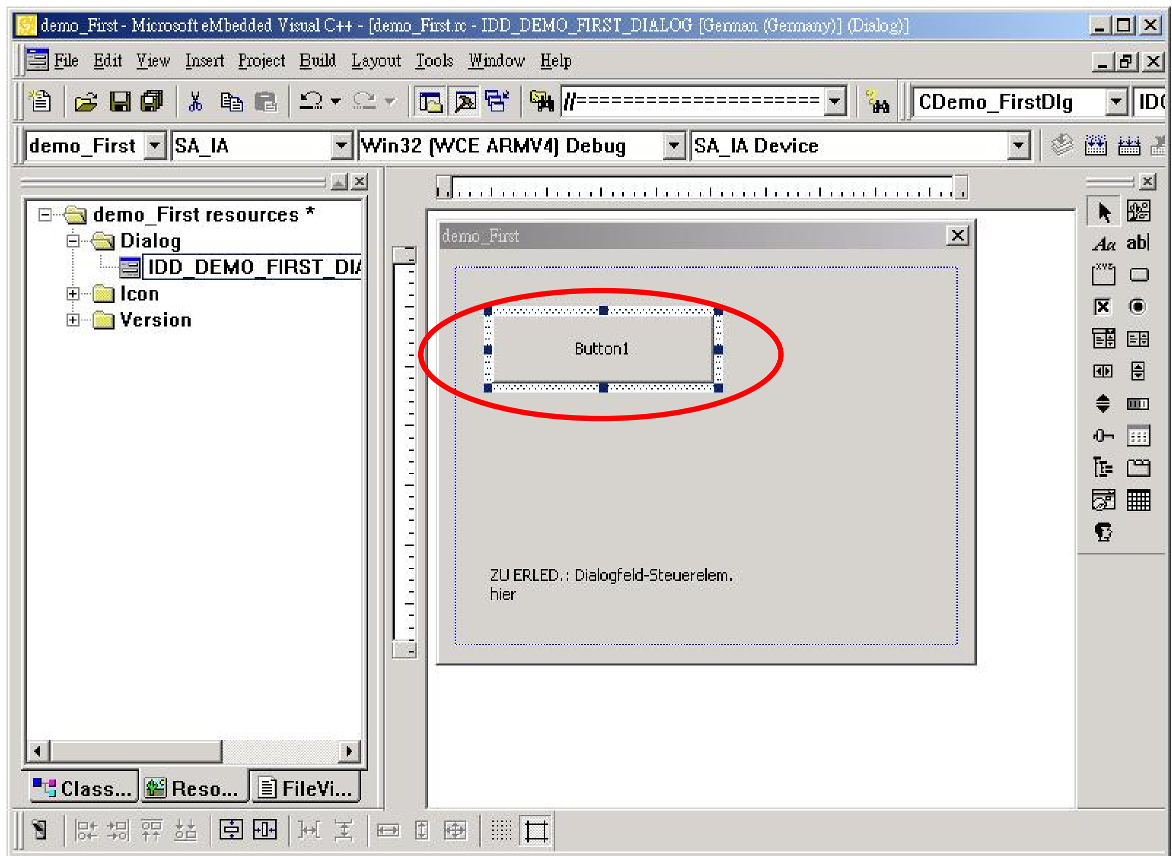


E. 增加程式庫的檔案路徑，在 “Directories” 下方空行處 (指出附近空的長方形)雙擊-按滑鼠鍵，輸入包括含有用戶安裝程式庫的檔案路徑，如下圖。

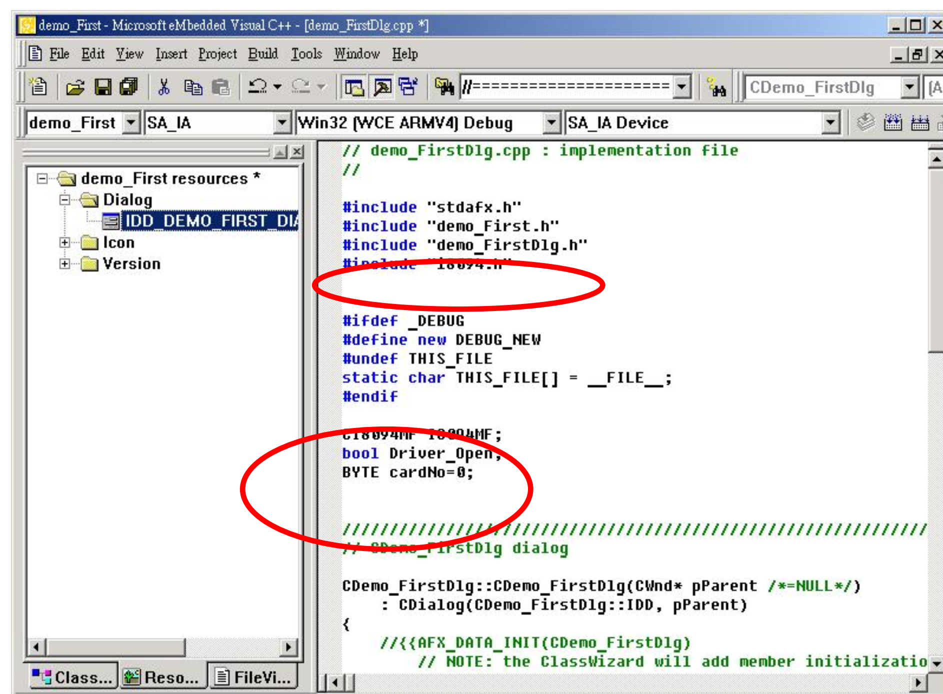


4.1.5 在 eVC++ 專案中開始應用

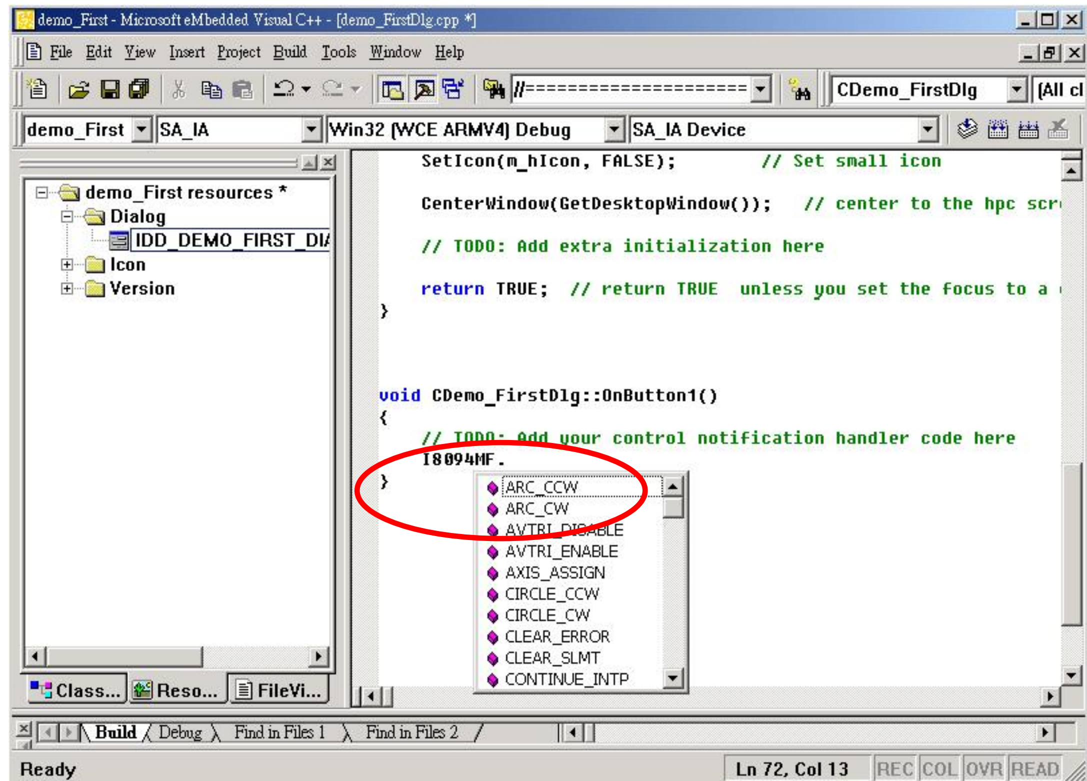
在 **Dialog** 中加入一 **BUTTON** 如下圖:



在 **BUTTON** 快按兩下，並產生一副程式，並在檔案起始位置加入**"#include "i8094.h" "WinConSDK.h"**及宣告 **CI8094MF I8094MF; bool Driver_Open; BYTE cardNo=0;**變數，如下圖:



由於我們有另建一類別(Class) CI8094MF(For 巨集指令)，方便導引程式設計，使用者也可以直接使用手冊指令。在 BUTTON 快按兩下，並產生一副程式中，鍵入"I8094MF." 及會出現引導視窗，協助您選用相關指令.



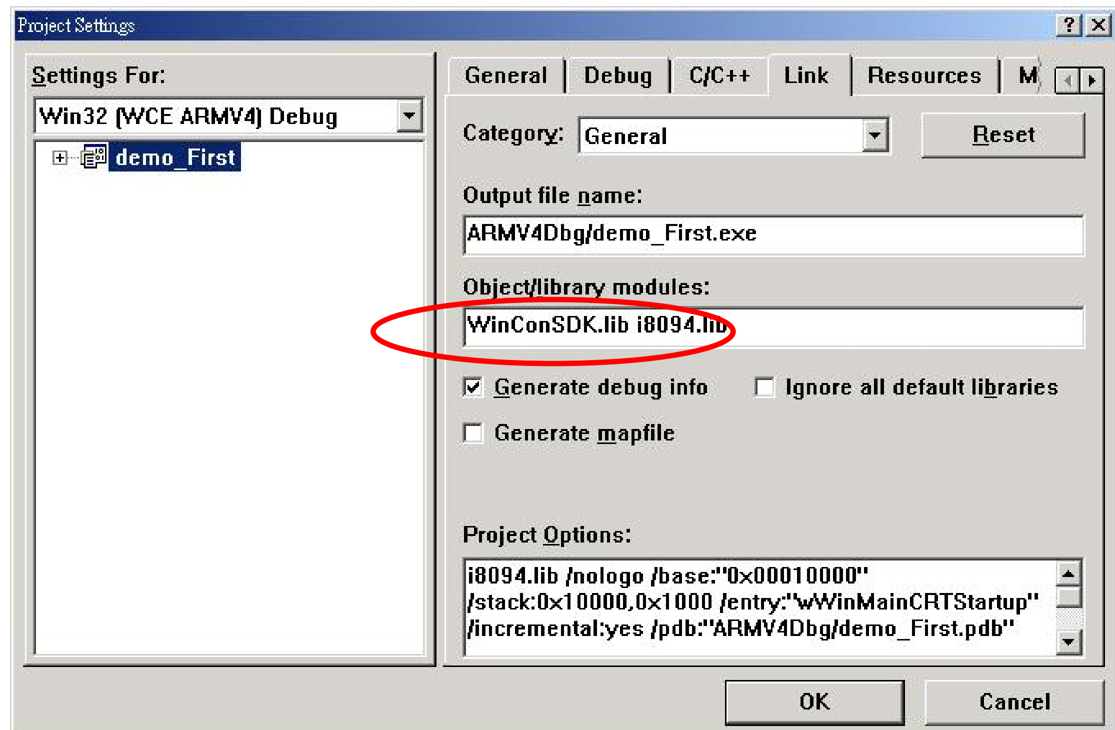
請選 "i8094MF.REGISTRATION"與輸入"(cardNo,3); " 表示插在第 3 Slot 的 i8094 註冊為第 0 卡，輸入詳細程式如下:

```
//=====’Step 1 Driver init
if   (!Driver_Open)
{
        I8094MF.REGISTRATION(cardNo,3);
        Driver_Open = true;
}
//=====’Step 2 CONFIG IO
I8094MF.RESET_CARD (cardNo);
I8094MF.SET_PULSE_MODE (cardNo, AXIS_XYZU, 2);        //set the pulse output mode
I8094MF.SET_ALARM (cardNo, AXIS_XYZU, 0, 0);          //disable the SERVO ALARM Input
I8094MF.SET_ENCODER (cardNo, AXIS_XYZU, 0, 0, 0);     //set the encoder input type
I8094MF.SET_MAX_V (cardNo, AXIS_XYZU, 16000);         //set the max speed for XYZU
I8094MF.EXD_DISABLE (cardNo, AXIS_XYZU);              //set the external input Off
I8094MF.SET_LP (cardNo, AXIS_XYZU, 0);                //set the Logic position =0
I8094MF.SET_EP (cardNo, AXIS_XYZU, 0);                //set the Encoger position =0
I8094MF.SET_A (cardNo, AXIS_XYZU, 1000);              //set the Acc =1000
```

```
    I8094MF.SERVO_ON (cardNo, AXIS_XYZU);               //set the Servo_ON to servo motors
    //======'Step 3 Check ERROR
    WORD KK=0;
    KK= I8094MF.GET_ERROR(cardNo);
    CString MSGG;
    if (KK != YES)
    {
        //No ERROR: Step 4 Move X axis
        BYTE axis=AXIS_X;    //for AXIS_X it can be to AXIS_XYZU
        I8094MF.SET_MAX_V(cardNo, axis, 20000);
        I8094MF.NORMAL_SPEED(cardNo, axis, 0);          //set axis as Symmetrical T curve mode
        I8094MF.SET_V(cardNo, axis, 20000);             //set v=10000 PPS
        I8094MF.SET_A(cardNo, axis, 100000);            //set acc=100000 PPS/S
        I8094MF.SET_SV(cardNo, axis, 10);               //set start speed=1000 PPS
        I8094MF.SET_AO(cardNo, axis, 0);                //set offset pulse (at SV speed)= 0 PS
        I8094MF.FIXED_MOVE(cardNo, axis, 10000);        //run the fixed 10000 Pulse move.
        while (I8094MF.STOP_WAIT(cardNo, axis) == NO)
        {
            DoEvents();
            Sleep(1);
            //wait for axis to stop
        }
        long AA= I8094MF.GET_LP(cardNo,axis);      //Get X Now position
    }
    else
    {
        //Please check the ERROR CODE
        //Get X ERROR CODE
        KK= I8094MF.GET_ERROR_CODE(cardNo, AXIS_X);
        //Get Y ERROR CODE
        KK= I8094MF.GET_ERROR_CODE(cardNo, AXIS_Y);
        //Get Z ERROR CODE
        KK= I8094MF.GET_ERROR_CODE(cardNo, AXIS_Z);
        //Get U ERROR CODE
        KK= I8094MF.GET_ERROR_CODE(cardNo, AXIS_U);
        //====================================
    }
```

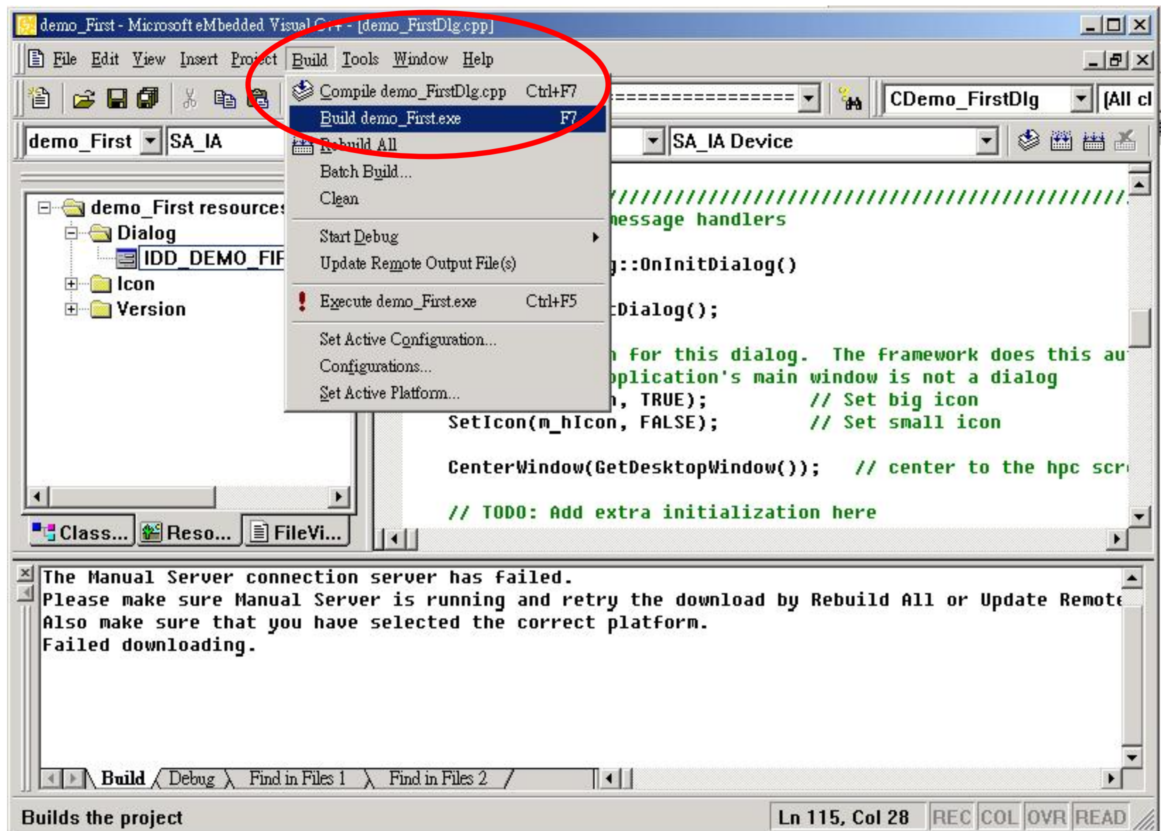
詳細請參考: demo_First 範例

完成後，請在功能表中選 **“Project”->”Setting”**出現如下對話框，選**”Link”**頁籤，並在 **Object/library modules:**輸入 **WinConSDK.lib i8094.lib**(如下圖)，並按 **OK**



4.1.6 編譯專案成可執行檔

請在功能表中選 **"Build"->"Build All"**如沒問題話，即完成這簡單的程式



4.1.7 下載與執行

請將執行檔"**i8094Demo.exe**"與動態連結檔"**I8094.dll**"複製到 **WinCon** 同一目錄中 (可用 **eVC++ Online Download**，或 **FTP** ，或 **USB** 行動碟) ，並用執行即可。

4.2 WinCon Microsoft Visual Studio .NET 2003(VB.NET，C#)

因 **Microsoft Visual Studio .NET 2003** 開發環境相似，因此我們以 **VB.NET** 作示範

4.2.1 確認相關檔案

請確認您有以下相關檔案:

i8094.dll

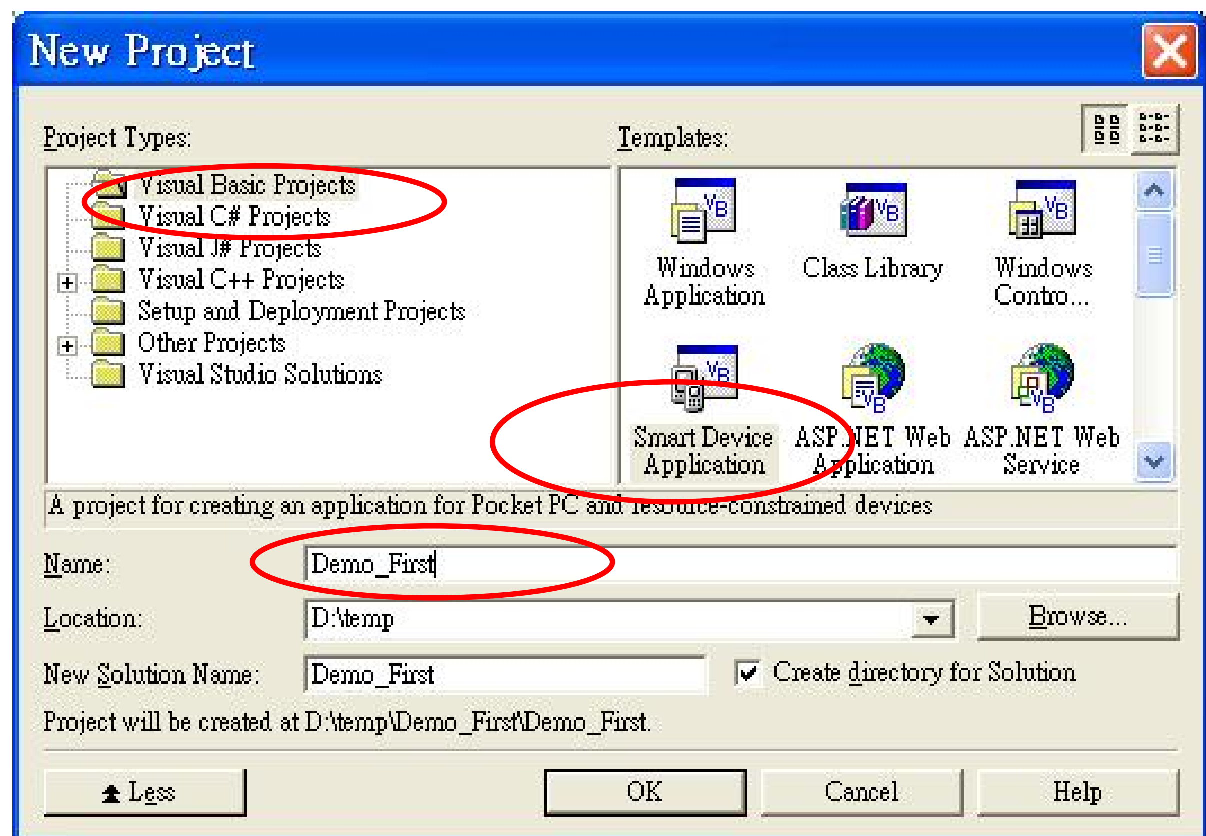
i8094_NET.dll

如您沒有,請找 **CD** 或到我們的網站下載最新版本資料

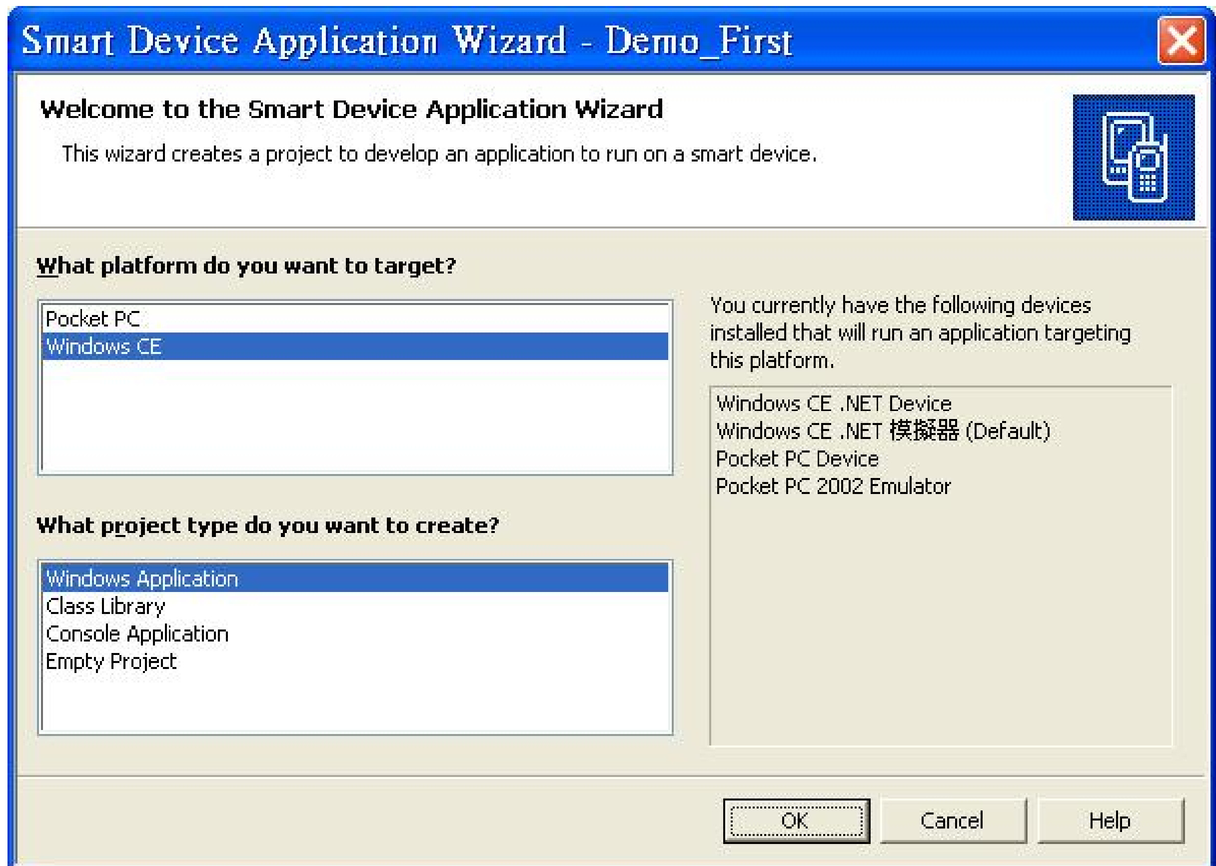
http://www.icpdas.com/download/download-list.htm

4.2.2 開一新專案

請啟動 **Microsoft Visual Studio .NET 2003** ，並新增一 **VB** 專案並選 "智慧型裝置" 如下圖選項:



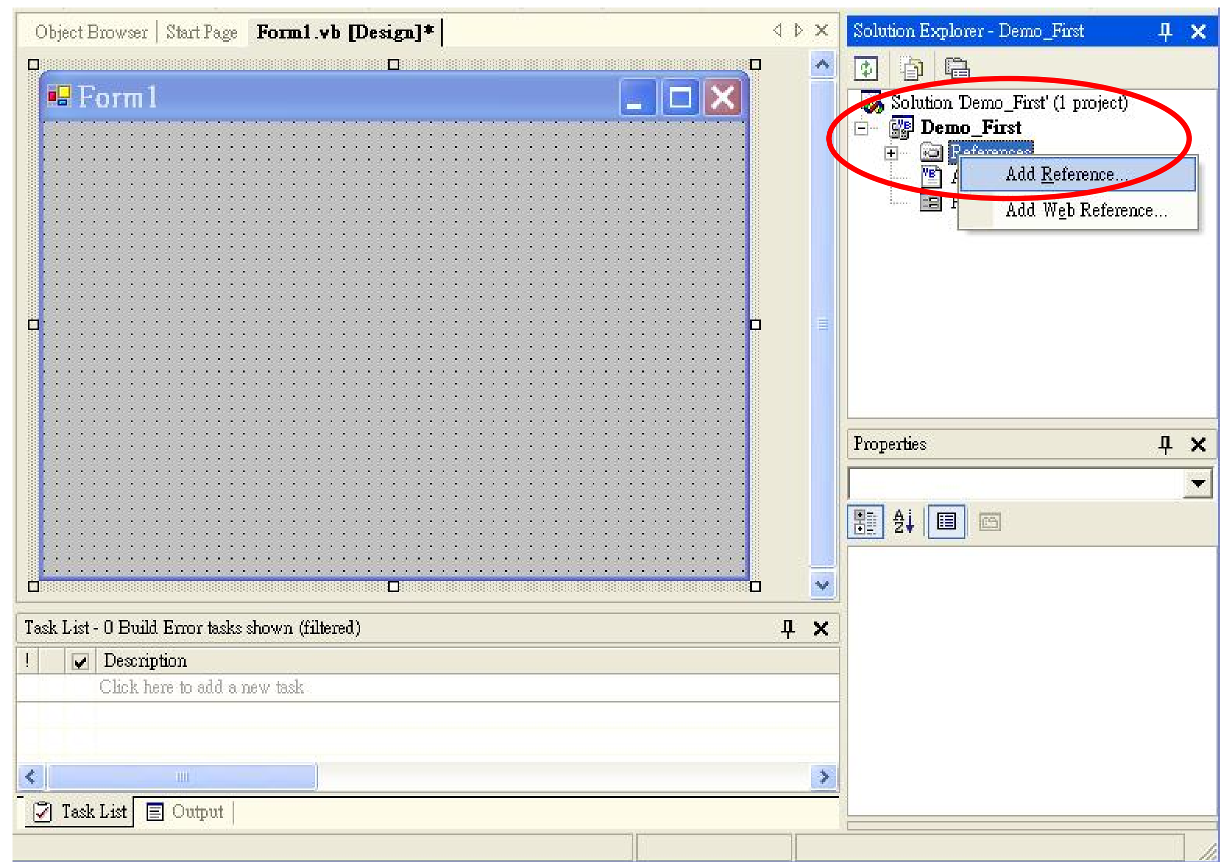
選 "確定" 後



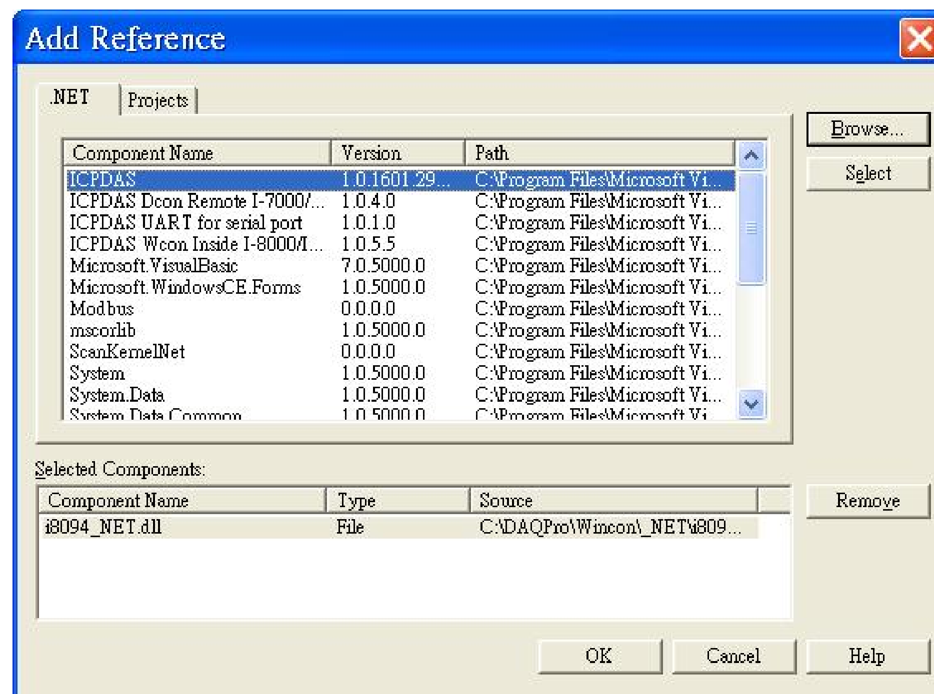
再選 **WinDows CE** 及 **Windows Application**，再選 ”確定”

4.2.3 在專案中加入參考 DLL

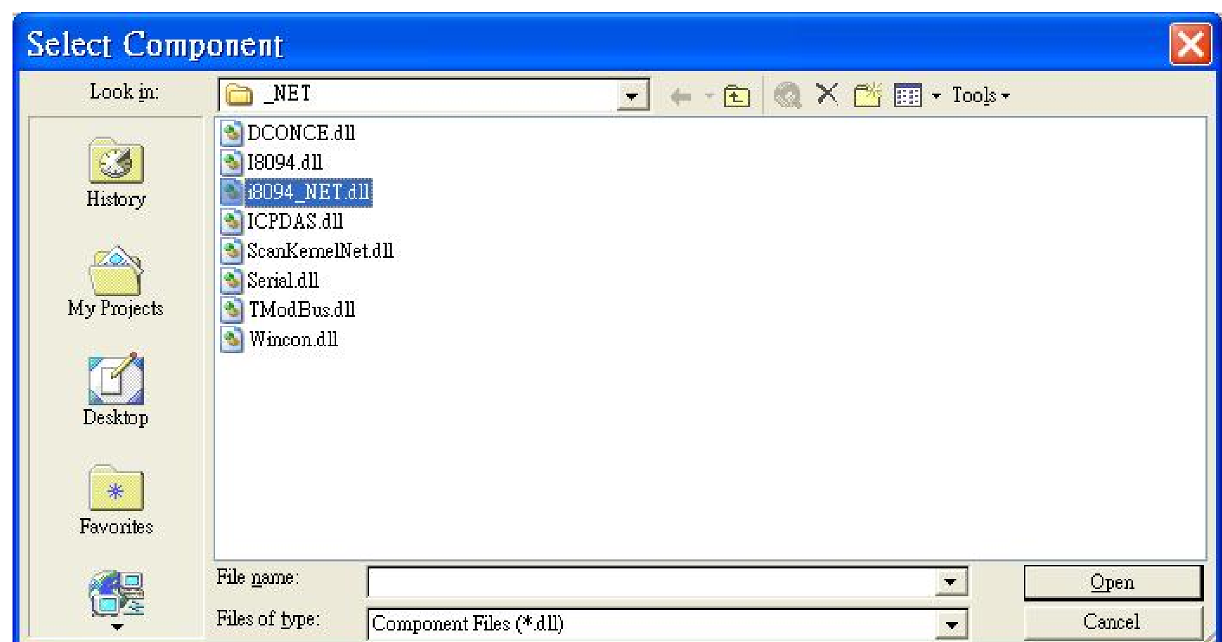
在方案總管中之參考上按滑鼠右鍵=>add Reference



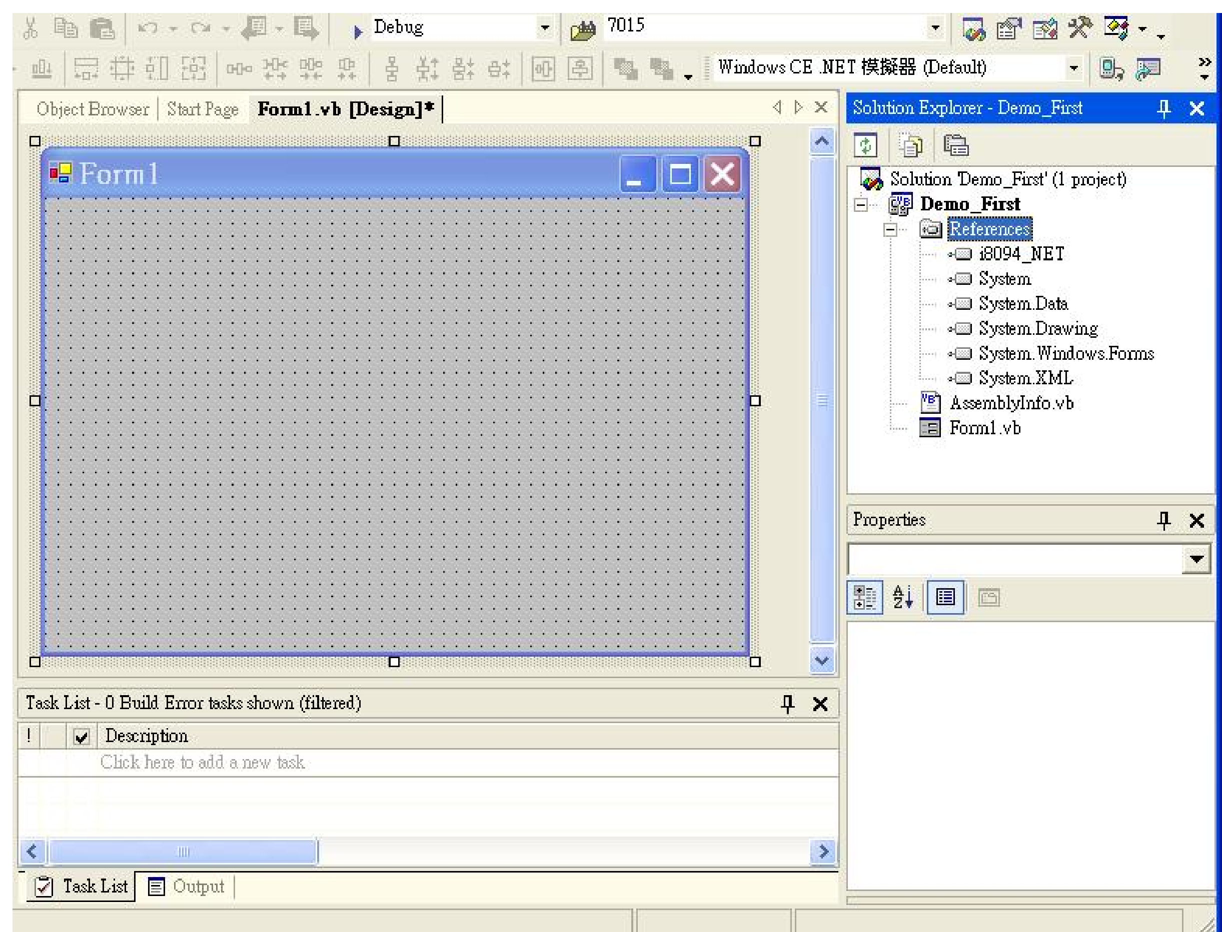
=>選擇 Browse



選擇 **i8904 _NET.DLL**

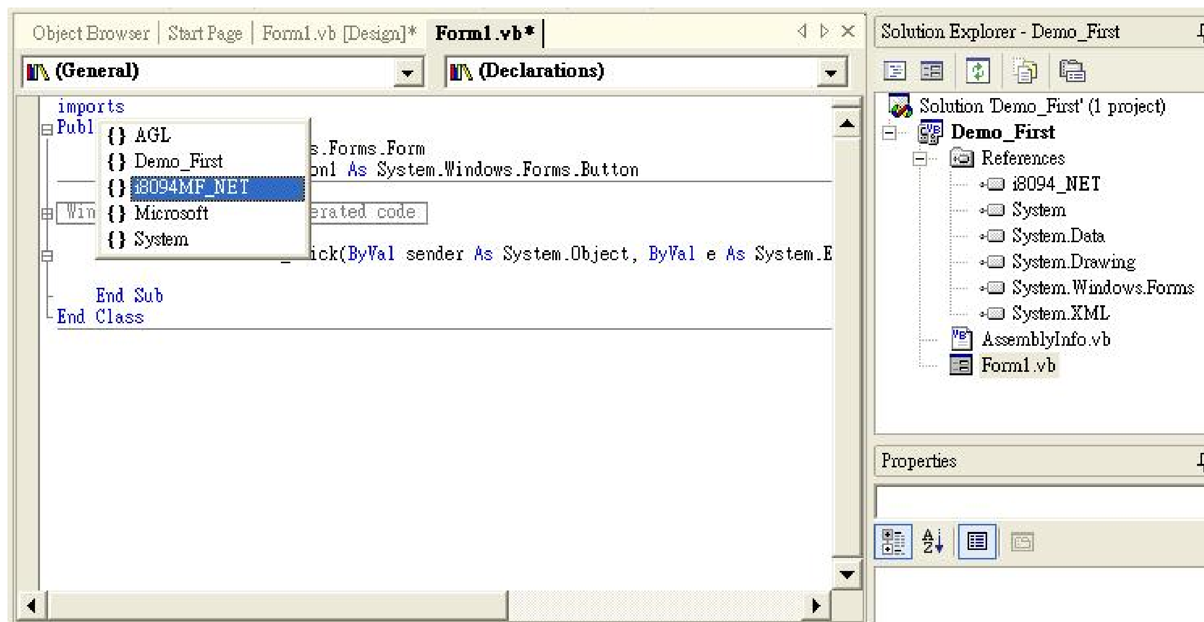


選擇 **"Open"** 如下圖:

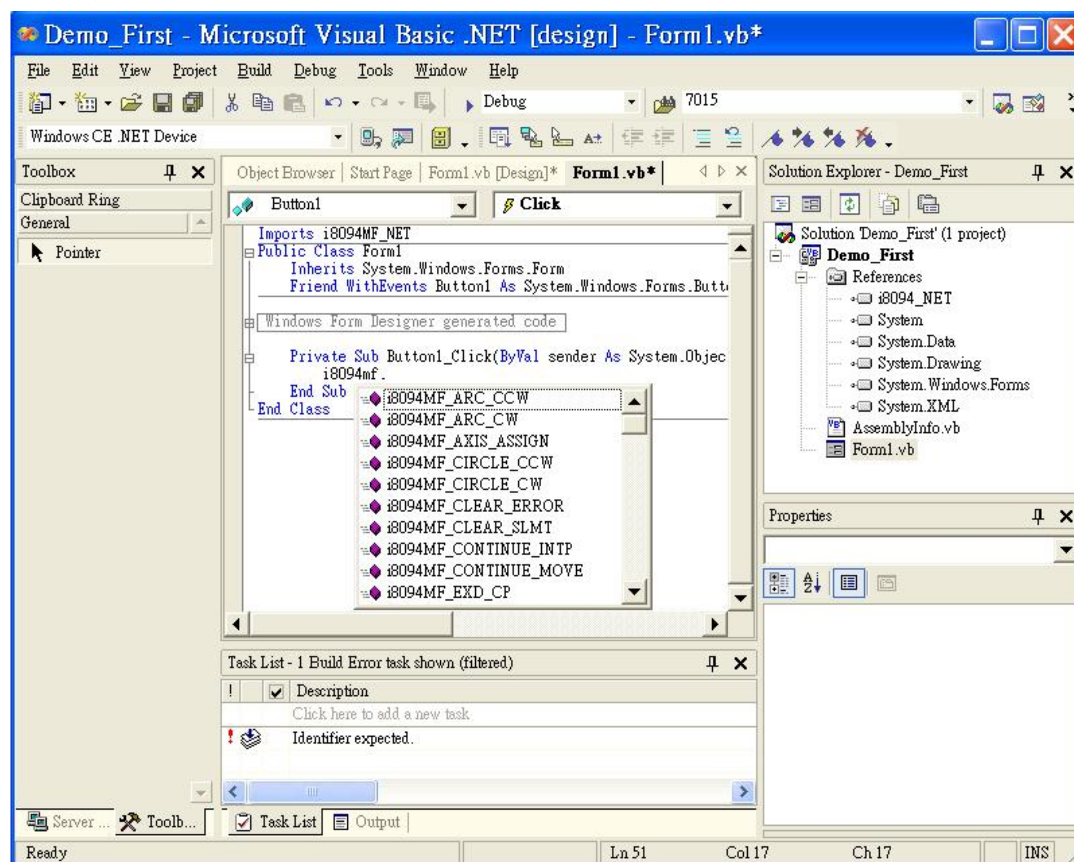


4.2.4 開始程式撰寫

在 **Form1** 中加入一 **"BUTTON"** 物件，並雙擊 **BUTTON**，出現 **Form1.vb** 程式碼，並在最前面加入 **"imports i8094MF_NET"** 如下圖:



在 **Button1_Click** 中加入輸入程式 **"i8094MF."**及會出現下拉式功能表，可以引導進行程式設計，



例如:程式輸入為➔ **I8094MF.i8094MF_REGISTRATION(1, 3)**

輸入詳細程式如下:

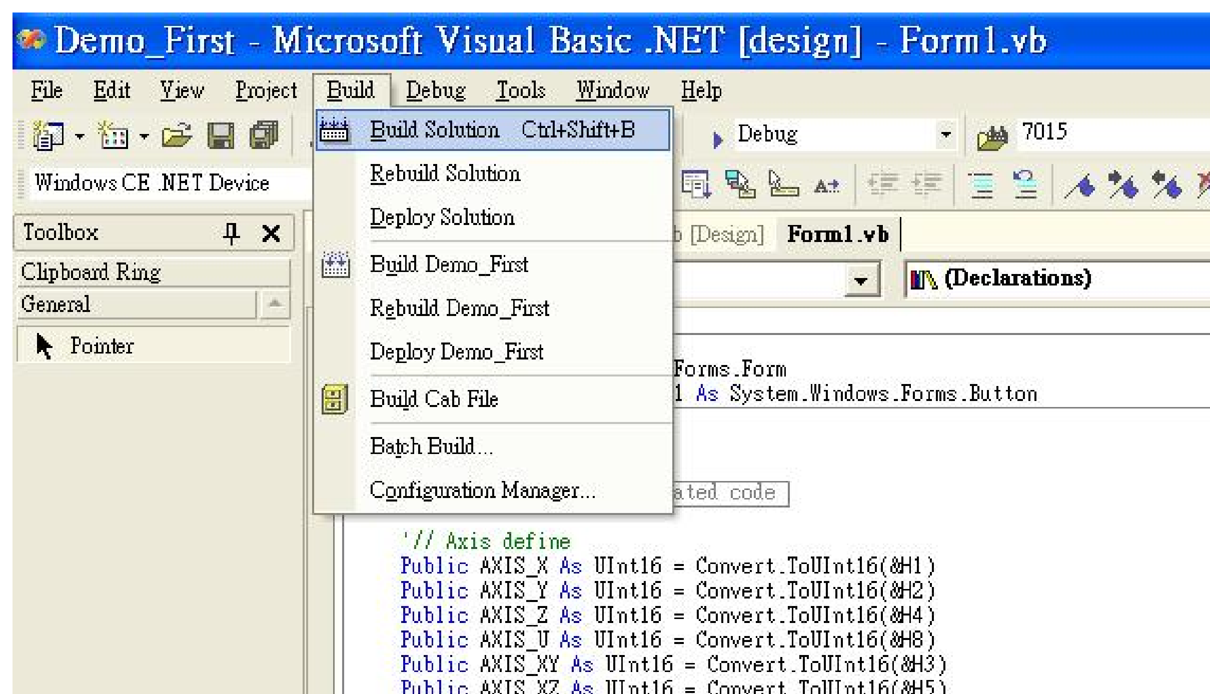
```
'=====’Step 1 Driver init
        If Not Driver_Open Then
            i8094MF.i8094MF_REGISTRATION(cardNo, 1)
            Driver_Open = True
        End If
        '=====’Step 2 CONFIG IO
        i8094MF.i8094MF_RESET_CARD(cardNo)
        i8094MF.i8094MF_SET_PULSE_MODE(cardNo, AXIS_XYZU, 2)   'set the pulse output mode
        i8094MF.i8094MF_SET_ALARM(cardNo, AXIS_XYZU, 0, 0)   'disable the SERVO ALARM Input
        i8094MF.i8094MF_SET_ENCODER(cardNo, AXIS_XYZU, 0, 0, 0) 'set the encoder input type
        i8094MF.i8094MF_SET_MAX_V(cardNo, AXIS_XYZU, Convert.ToUInt32(16000))   'set the max speed for XYZU
        i8094MF.i8094MF_EXD_DISABLE(cardNo, AXIS_XYZU)   'set the external input Off
        i8094MF.i8094MF_SET_LP(cardNo, AXIS_XYZU, 0)   'set the Logic position =0
        i8094MF.i8094MF_SET_EP(cardNo, AXIS_XYZU, 0)   'set the Encoger position =0
        i8094MF.i8094MF_SET_A(cardNo, AXIS_XYZU, Convert.ToUInt32(1000))   'set the Acc =1000
        i8094MF.i8094MF_SERVO_ON(cardNo, AXIS_XYZU)   'set the Servo_ON to servo motors
        '======’Step 3 Check ERROR
        Dim KK As Long = 0
        KK = i8094MF.i8094MF_GET_ERROR(cardNo)
        Dim MSGG As String
        If (KK <> YES) Then
            'No ERROR: Step 4 Move X axis
            Dim axis As UInt16 = AXIS_X 'for AXIS_X it can be to AXIS_XYZU
            i8094MF.i8094MF_SET_MAX_V(cardNo, axis, Convert.ToUInt32(20000))
            i8094MF.i8094MF_NORMAL_SPEED(cardNo, axis, Convert.ToUInt16(0))   'set axis as Symmetrical T curve
mode
            i8094MF.i8094MF_SET_V(cardNo, axis, Convert.ToUInt32(20000))   'set v=10000 PPS
            i8094MF.i8094MF_SET_A(cardNo, axis, Convert.ToUInt32(100000))   'set acc=100000 PPS/S
            i8094MF.i8094MF_SET_SV(cardNo, axis, Convert.ToUInt32(10))   'set start speed=1000 PPS
            i8094MF.i8094MF_SET_AO(cardNo, axis, 0)   'set offset pulse (at SV speed)= 0 PS
            i8094MF.i8094MF_FIXED_MOVE(cardNo, axis, 10000) 'run the fixed 10000 Pulse move.
            Do While (i8094MF.i8094MF_STOP_WAIT(cardNo, axis) = NO)
                i8094MF.system.DoEvents()
                System.Threading.Thread.Sleep(1)
                'wait for axis to stop
            Loop
            Dim AA As Long = i8094MF.i8094MF_GET_LP(cardNo, axis)   'Get X Now position
        Else
```

```
        'Please check the ERROR CODE
        'Get X ERROR CODE
        KK = Convert.ToInt32(i8094MF.i8094MF_GET_ERROR_CODE(cardNo, AXIS_X))
        'Get Y ERROR CODE
        KK = Convert.ToInt32(i8094MF.i8094MF_GET_ERROR_CODE(cardNo, AXIS_Y))
        'Get Z ERROR CODE
        KK = Convert.ToInt32(i8094MF.i8094MF_GET_ERROR_CODE(cardNo, AXIS_Z))
        'Get U ERROR CODE
        KK = Convert.ToInt32(i8094MF.i8094MF_GET_ERROR_CODE(cardNo, AXIS_U))
        '====================================
    End If
```

詳細請參考: **demo_First** 範例

4.2.5 建置專案

在功能表上選擇“建置”➔”建置專案”如沒問題即可產生執行檔



4.2.6 下載與執行

請將執行檔”Demo_First.exe” 與動態連結檔 “I8094.dll” “I8094_NET.dll”複製到 **WinCon** 同一目錄中(可用 **VS.NET Online Download**，或 **FTP** ，或 **USB** 行動碟) ，執行即可。

4.3 I-8000 Turbo C

4.3.1 確認相關檔案

請確認您有以下相關檔案:

I8094.lib

I8094.h

I8000.lib

I8000.h

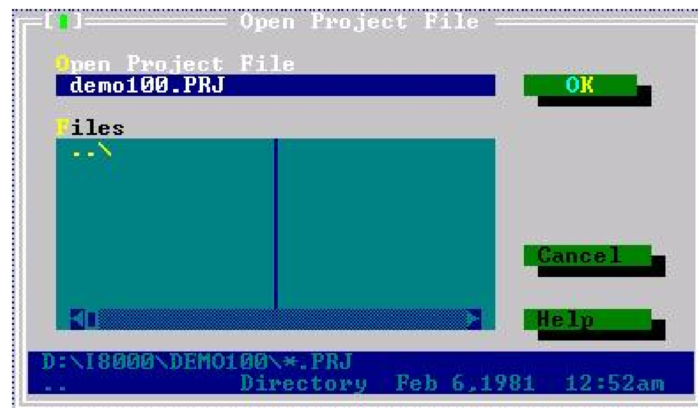
如您沒有,請找 **CD** 或到我們的網站下載最新版本資料

http://www.icpdas.com/download/download-list.htm

4.3.2 使用 TC ++ 來編譯程式的方式如下：

4.3.3 開一新專案

1. 在 **demo100** 這個目錄下執行 **TC.EXE**，建一個新的 **Project**，**demo100.prj**

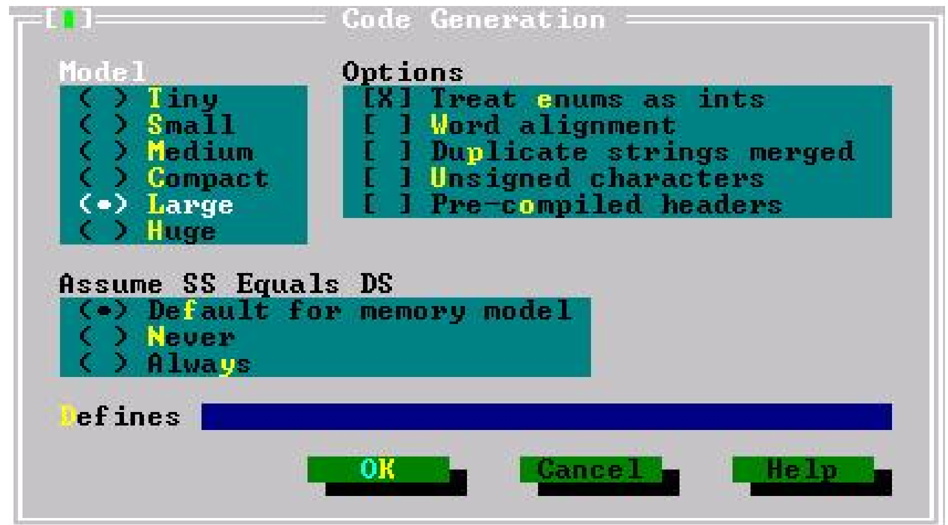


2. 加入 **project** 的內容：**demo100.cpp** 及 **..\lib\8000l.lib**，**I8094.lib**



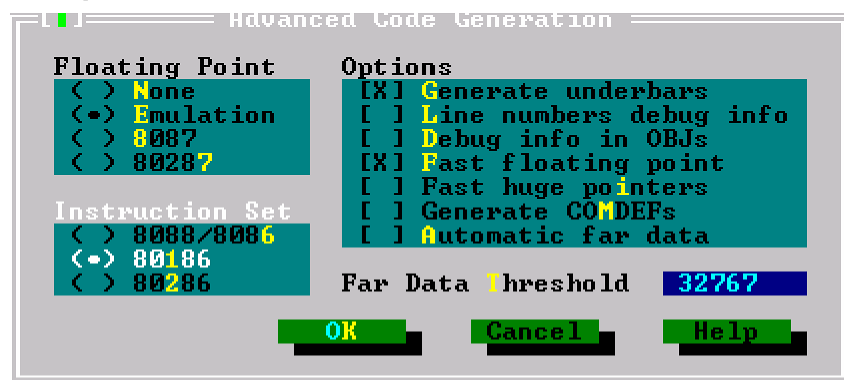
3. 設定有關的選項 (option)。

- **Compiler -> Code Generation** 的選項如下：

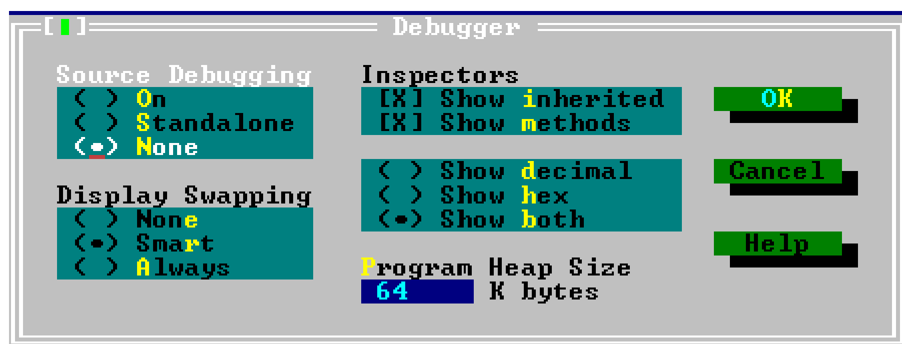


▪

- **Compiler -> Advance Code Generation** 的選項如下：



- **Debugger** 的設定如下，把 **Source debugging** 關掉。



4.3.4 撰寫程式

1. 在 demo100.cpp 檔頭加入參考宣告:

```
#include <dos.h>
#include <math.h>
#include "8000.h"
#include "I8094.h"
BYTE cardNo;
long   x_value, y_value, z_value, u_value;
```

2. 在主程式中加入相關程式(請參考demo100.cpp):

```
void main ()
{
    //================== I-8000 ==================
    //Set (slot0~slot7) = cardNO (1~8)。
    BYTE slot;
    int Found = 0;
    for (slot = 0; slot < 8; slot++)
    {
        cardNo = slot + 1;
        if (i8094MF_REGISTRATION(cardNo, slot) == YES)
        {
            //Found Axis Card。
            i8094MF_RESET_CARD(cardNo);
            Found++;
        }
    }
    if (Found == 0)
    {
    //Not Found。
        Print("I-8094 card not found ! \r\n");
    return;
    }
    cardNo = 1;
    i8094MF_INIT_CARD(cardNo);
    i8094MF_SET_PULSE_MODE(cardNo, AXIS_XYZU, 2);
    i8094_IN3_LEVEL(cardNo,AXIS_XYZU, 1);
    i8094MF_SET_ALARM(cardNo, AXIS_XYZU, 1, 1);
   i8094MF_SET_ENCODER(cardNo, AXIS_XYZU, 0, 0, 0);
```

```
i8094MF_SET_MAX_V(cardNo, AXIS_XYZU, 16000);
//==========================================================================
BYTE ret1 = 0;
BYTE chkey;
DWORD sv;     //PPS
DWORD v;      //PPS
DWORD a;      //PPS/s
i8094MF_SERVO_ON(cardNo, AXIS_XYZU);
do
{
    Print(" (0:Exit, 1:HELIX_3D_1, 2:HELIX_3D_2, 3:RATIO, 4:FRnet output, 5:FRnet input)
\r\n");
    Print(" (6:Reset Encoder, 7:Stop, 8:Clear Error) \r\n");
    Print(" (X:Jog X, Y:Jog Y, Z:Jog Z, U:Jog U, S:Stop Jog) \r\n");
    Print("\n");
    Print("---------------------LOGIC AND REAL POSITION COUNTER---------------------\n");
    x_value = i8094MF_GET_LP(cardNo, AXIS_X);
    y_value = i8094MF_GET_LP(cardNo, AXIS_Y);
    z_value = i8094MF_GET_LP(cardNo, AXIS_Z);
    u_value = i8094MF_GET_LP(cardNo, AXIS_U);
    Print("LOGIC POSITION: x=%10ld,   y= %10ld, z= %10ld, u=%10ld \r\n", x_value, y_value,
z_value, u_value);
    x_value = i8094MF_GET_EP(cardNo, AXIS_X);
    y_value = i8094MF_GET_EP(cardNo, AXIS_Y);
    z_value = i8094MF_GET_EP(cardNo, AXIS_Z);
    u_value = i8094MF_GET_EP(cardNo, AXIS_U);
    Print("REAL POSITION:   x=%10ld,   y= %10ld, z= %10ld, u=%10ld \r\n", x_value, y_value,
z_value, u_value);
    while (!Kbhit());
    chkey=Getch();
    Print("%s\r\n",&chkey);
    switch (chkey)
    {
        case '0':
                i8094MF_RESET_CARD(cardNo);
                Print("EXIT! \r\n");
                return;
        //------------------------------------------------------------
```

```
		case '1':
				v=50000;//PPS。
				i8094MF_SET_MAX_V(cardNo, AXIS_XYZU,160000L);
				ret1=i8094MF_HELIX_3D(cardNo, AXIS_Y, AXIS_Z, AXIS_X, 1, v, 0,
1000, 5, -2000);
				Delay(1000);
				Print("HELIX_3D_1 ! \r\n");
				Print("ret1= %d \r\n",ret1);
				break;
		//-------------------------------------------------------------
		case '2':
				v=100000;//PPS。
				i8094MF_SET_MAX_V(cardNo, AXIS_XYZU,1600000L);
				ret1=i8094MF_HELIX_3D(cardNo, AXIS_Y, AXIS_Z, AXIS_U, 1, v, 0,
25000, 10, 3600);
				Delay(2000);
				Print("HELIX_3D_2 ! \r\n");
				Print("ret1= %d \r\n",ret1);
				break;
		//-------------------------------------------------------------
		case '3':
				sv=300;//PPS。
				v=30000;//PPS。
				a=500000;//PPS/s。
				int loop1;
				int loop2;
				float ratio;
				i8094MF_SET_MAX_V(cardNo, AXIS_XYZU,160000L);
				Print("RATIO_2D ratio ? \r\n");
				Scanf("%f", &ratio);
				Print("ratio= %f \r\n",ratio);
				i8094MF_RATIO_INITIAL(cardNo,AXIS_U, AXIS_X, sv, v, a, ratio);
				for (loop2 = 0; loop2 < 5; loop2++)
				{
					for (loop1 = 0; loop1 < 5; loop1++)
					{
						i8094MF_RATIO_2D(cardNo, 0, 3600, 0);
						i8094MF_RATIO_2D(cardNo, 0, 3600, 1);
```

```
                }
                i8094MF_RATIO_2D(cardNo, 0, 7200, 0);
                i8094MF_RATIO_2D(cardNo, 0, 3600, 1);
            }
            i8094MF_RATIO_2D(cardNo, 1, 7200, 1);
            Delay(3000);
            Print("RATIO_2D OK ! \r\n");
            break;
//-------------------------------------------------------------
case '4':
            WORD wSA;
            WORD data;
            Print("FRnet wSA ? \r\n");
            Scanf("%d", &wSA);
            Print("FRnet 16 bits data ? \r\n");
            Scanf("%d", &data);
            i8094MF_FRNET_SA(cardNo, wSA, data);
            break;
//-------------------------------------------------------------
case '5':
            WORD wRA;
            Print("FRnet wRA ? \r\n");
            Scanf("%d", &wRA);
            long data1 = i8094MF_FRNET_RA(cardNo, wRA);
            Print("FRnet 16 bits data = %10ld \r\n", data1);
            break;
//-------------------------------------------------------------
case '6':
            i8094MF_SET_LP(cardNo, AXIS_XYZU, 0);
            i8094MF_SET_EP(cardNo, AXIS_XYZU, 0);
            Print("RESET Encoder ! \r\n");
            break;
//-------------------------------------------------------------
case '7':
            i8094MF_STOP_SLOWLY(cardNo, AXIS_XYZU);
            Print("STOP! \r\n");
            break;
//-------------------------------------------------------------
```

```
case '8':
            i8094MF_CLEAR_ERROR(cardNo);
            Print("CLEAR ERROR ! \r\n");
            break;
//-----------------------------------------------------------------
case 88:
case 120:
            BYTE m_Axis=AXIS_X;
            i8094MF_SET_MAX_V(cardNo, m_Axis, 32000);
            i8094MF_NORMAL_SPEED(cardNo, m_Axis, 0);    //set axis as
Symmetrical T curve mode
            i8094MF_SET_A(cardNo, m_Axis, 50000);//set Acc =50000 PPS/S
            i8094MF_SET_V(cardNo, m_Axis, 50000);
            i8094MF_EXD_MP(cardNo, AXIS_X, 100);
            i8094MF_EXD_DISABLE(cardNo, AXIS_Y);
            i8094MF_EXD_DISABLE(cardNo, AXIS_Z);
            i8094MF_EXD_DISABLE(cardNo, AXIS_U);
            break;
//-----------------------------------------------------------------
case 89:
case 121:
            m_Axis=AXIS_Y;
            i8094MF_SET_MAX_V(cardNo, m_Axis, 32000);
            i8094MF_NORMAL_SPEED(cardNo, m_Axis, 0);    //set axis as
Symmetrical T curve mode
            i8094MF_SET_A(cardNo, m_Axis, 50000);//set Acc =50000 PPS/S
            i8094MF_SET_V(cardNo, m_Axis, 100000);
            i8094MF_EXD_MP(cardNo, AXIS_Y, 100);
            i8094MF_EXD_DISABLE(cardNo, AXIS_X);
            i8094MF_EXD_DISABLE(cardNo, AXIS_Z);
            i8094MF_EXD_DISABLE(cardNo, AXIS_U);
            break;
//-----------------------------------------------------------------
case 90:
case 122:
            m_Axis=AXIS_Z;
            i8094MF_SET_MAX_V(cardNo, m_Axis, 32000);
            i8094MF_NORMAL_SPEED(cardNo, m_Axis, 0);    //set axis as
```

```
Symmetrical T curve mode
                        i8094MF_SET_A(cardNo, m_Axis, 50000);//set Acc =50000 PPS/S
                        i8094MF_SET_V(cardNo, m_Axis, 10000);
                        i8094MF_EXD_MP(cardNo, AXIS_Z, 100);
                        i8094MF_EXD_DISABLE(cardNo, AXIS_X);
                        i8094MF_EXD_DISABLE(cardNo, AXIS_Y);
                        i8094MF_EXD_DISABLE(cardNo, AXIS_U);
                        break;
            //--------------------------------------------------------------
            case 85:
            case 117:
                        m_Axis=AXIS_U;
                        i8094MF_SET_MAX_V(cardNo, m_Axis, 32000);
                        i8094MF_NORMAL_SPEED(cardNo, m_Axis, 0);     //set axis as
Symmetrical T curve mode
                        i8094MF_SET_A(cardNo, m_Axis, 50000);//set Acc =50000 PPS/S
                        i8094MF_SET_V(cardNo, m_Axis, 10000);
                        i8094MF_EXD_MP(cardNo, AXIS_U, 5);
                        i8094MF_EXD_DISABLE(cardNo, AXIS_X);
                        i8094MF_EXD_DISABLE(cardNo, AXIS_Y);
                        i8094MF_EXD_DISABLE(cardNo, AXIS_Z);
                        break;
            //--------------------------------------------------------------
            case 83:
            case 115:
                        i8094MF_EXD_DISABLE(cardNo, AXIS_X);
                        i8094MF_EXD_DISABLE(cardNo, AXIS_Y);
                        i8094MF_EXD_DISABLE(cardNo, AXIS_Z);
                        i8094MF_EXD_DISABLE(cardNo, AXIS_U);
                        break;
            //--------------------------------------------------------------
            default:
                        break;
        }
    } while (1);
}
```

4.3.5 撰編譯連結程式

最後按下 F9 就會進行編譯，LINK 成 demo100.EXE。

```
                   Linking
 EXE file  : ..\..\TCPP\DEMO100.EXE
 Linking   : \TCPP\LIB\CL.LIB

                       Total      Link
   Lines compiled:  0          PASS 2
         Warnings:  0          0
           Errors:  0          0

  Available memory: 1928K
  Success          :        Press any key
```

4.3.6 Download 程式到 I-8000 系列 PAC 控制器

1. 請在 PC 端執行 7188x.EXE（這是一個 DOS 模式的執行檔，可以在純 DOS 下或 WIN9x 或 WIN-NT 或 WIN2K 的 DOS BOX 下執行）或是 7188xw.EXE （這是一個 win32 的執行檔，要在 WIN9x 或 WIN-NT 或 WIN2K 下執行）。
2. 請將依實際接線將 COM PORT 設成 COM1(ALT_1) 或 COM2(ALT_2)。傳輸速度設成 115200,N,8,1。
3. 打開 I-8000 的電源。此時有兩種可能的狀況：
   - 如果 INIT* 接腳有接到 INIT*COM 將會出現 MiniOs7 的版本訊息。然後出現 I-8000>。
   - 如果 INIT* 接腳不接，I-8000 將會開始執行 AUTOEXEC.BAT 所設定的命令。執行完後一樣出現 I-8000>。
4. 當出現 I-8000> 後就可以下命令給 I-8000 了如下圖。

```
7188XW 1.24 [COM4:115200,N,8,1],FC=0,CTS=1, DIR=C:\Progra...
7188x for WIN32 version 1.24 (10/31/2003)[By ICPDAS. Tim.]
Current set: Use COM4 115200,N,8,1
AutoRun:demo2.exe
Autodownload files: None
Current work directory="C:\Program Files\7188E\PCDiag"
original baudrate = 1200!
now baudrate = 115200!

ICP_DAS MiniOS7 for I-8000 Ver. 2.00 build 001,Mar 30 2004 17:30:23
SRAM:512K, FLASH MEMORY:512K
[CPU=Am188ES]
Serial number= 01 A3 A6 9F 09 00 00 62

i-8000>_
```

5. 按下 **F2** 鍵，輸入 **demo100.exe**，再按 **F10** 自動 **download** 並執行 **demo100.exe** 如下圖:

```
7188XW 1.24 [COM4:115200,N,8,1],FC=0,CTS=1, DIR=C:\Progra...
now baudrate = 115200!

ICP_DAS MiniOS7 for I-8000 Ver. 2.00 build 001,Mar 30 2004 17:30:23
SRAM:512K, FLASH MEMORY:512K
[CPU=Am188ES]
Serial number= 01 A3 A6 9F 09 00 00 62

i-8000>
Input filename:demo100.exe
When Press F8/F9/F10 will auto download the file:demo100.exe
[F10]LOADR
Press ALT_E to download file!
Load file:demo100.exe[crc=4000,0000]
Send file info. total 432 blocks
Block 432
Transfer time is: 11.927000 seconds

i-8000>runr
 (0:Exit, 1:HELIX_3D_1, 2:HELIX_3D_2, 3:RATIO, 4:Reset Encoder, 5:Stop, 6:Clear
Error)

----------------------LOGIC AND REAL POSITION COUNTER----------------------
LOGIC POSITION: x=  -1598583,  y= -1271690049, z= 1439068134, u=-191938561
REAL POSITION:  x=-991053608,  y= -280515019, z=  254699488, u=1876946677
```

詳情請參考:**I8000 CD** 中 **\Napdos\7188e\MiniOS7\doc\big5\index.htm** 選左手邊 **“7188E** 入門手冊” 有詳盡說明。

附錄 A

A.1 I8094 開發環境安裝內容

A.1.1 eVC ++ 4.0

1. 微軟 eVC++ 4.0: 至少到 ServicPack2(目前已到 ServicPack4)
2. WinCon8000_EVC4_SP1: WinCon 在 eVC++ 開發環境(SA_IA)
3. WinConSDK:WinCon 軟體開發工具(inc,lib,dll,demo…)

A.1.2 Visual Studio .NET 2003(VB.NET，C#)

1. 微軟 Visual Studio.NET 2003 專業版以上，須包含有 ”智慧型裝置應用程式” (SmartDeviceApplication)選項
2. 連線偵錯工具: Windows CE .NET Utilities v1.1 for Visual Studio .NET 2003
3. WinConSDK:WinCon 軟體開發工具(inc,lib,dll,demo…)

A.1.3 Turbo C

1. 寶蘭 Turbo C 2.0 以上

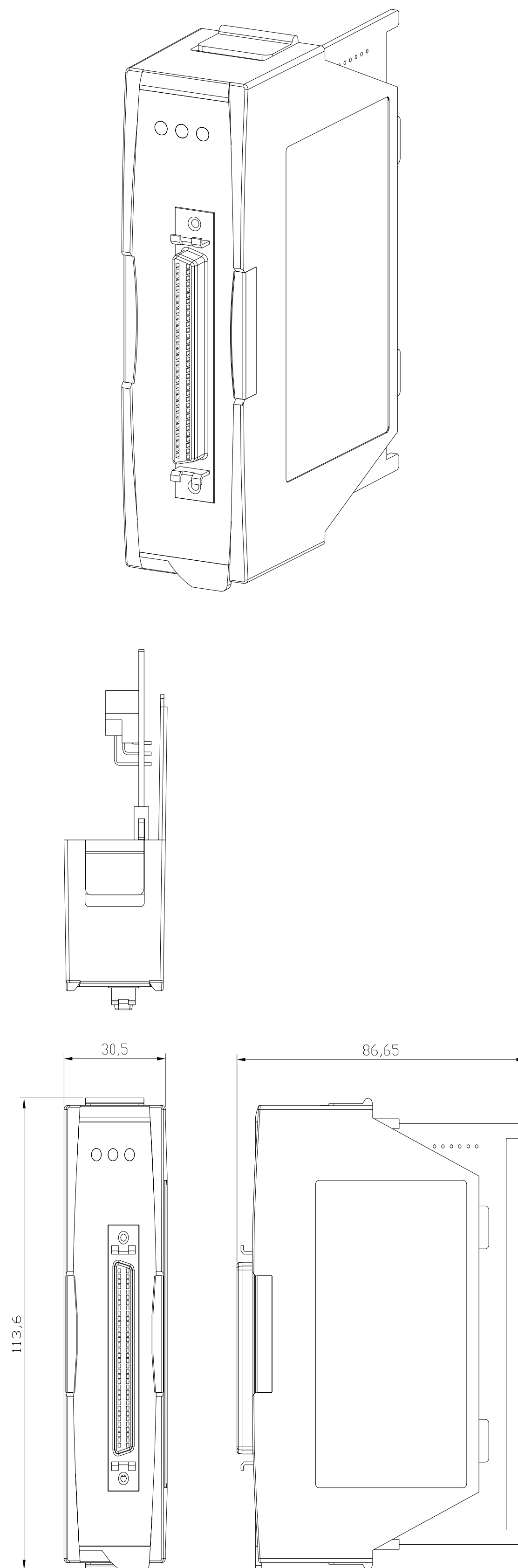
A.2 I8094 概觀


i-8094
i-8094


U-AXIS
Z-AXIS
X-AXIS
Y-AXIS
W-8331
i-8094


U-AXIS
Z-AXIS
X-AXIS
Y-AXIS
W-8737

A.3 外觀尺寸



A.4 版本更新內容註解

//========= V 1.5.1.1 ==================

變更 **FUNCTION** 參考手冊章節**(**配合 **i8094_Manual_1.5tc** 改版**)**

新增 3.9 Motion 同步運動

//========= V 1.4.0.1 ==================

i8094_*　==>i8094MF_*　(所有巨集指令**)**

i8094_MF.DLL ==>i8094.DLL

i8094_MF.h ==>i8094.h

i8094_MF_NET.DLL ==>i8094_NET.DLL

i8094 巨集指令手冊 **==> i8094** 運動控制模組使用手冊

Demo_First 變更**(eVC++** 及 **VB.NET)**

新增 **5.1 i8094** 開發環境安裝內容

附錄 B 其它 Terminal Boards

B.1 DN-8468M Daughter Board

The DN-8468M is the daughter board for Mitsubitch J2 Series Amplifier. It has 4-axis I/O signals.

B.1.1 Board Layout for DN-8468M

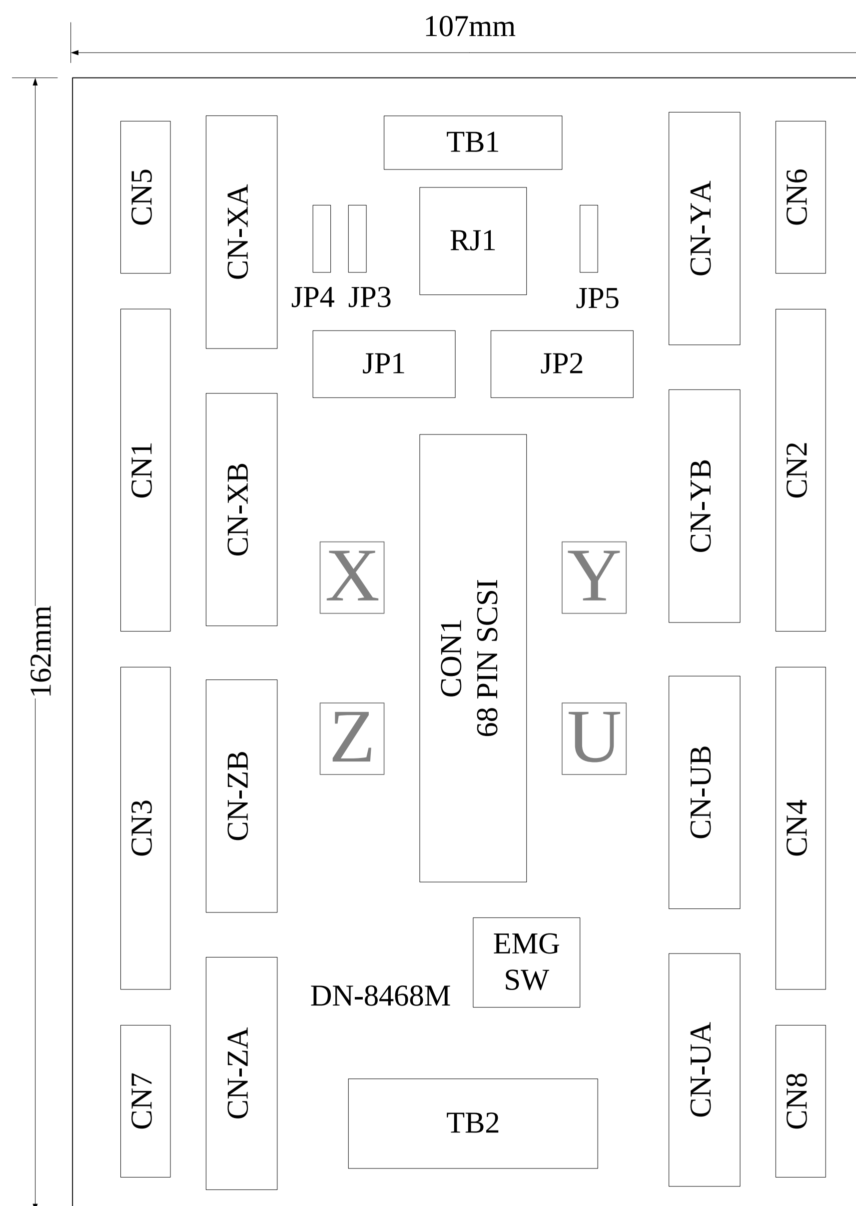


Fig. 1-1 Board layout for the DN-8468M

B.1.2 Signal Connections for DN-8468M

Maintaining signal connections is one of the most important factors in ensuring that your application system is sending and receiving data correctly.

■ Pin Assignment for CON1

The I/O connector on the DN-8468M is a 68-pin SCSI II connector that enables you to connect to the PISO-PS400 motion card. Please refer to the section 2.2.1(page 15).

■ TB1

The connector TB1 is 7-pin connector that enables you to connect to the signals of your motor drivers. Fig.1-3 shows the pin assignment for the 7-pin connector on the DN-8468M, and the Table 1-4 shows its I/O connector signal description.

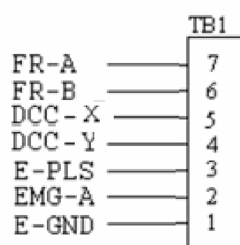


Fig. 1-3 Pin definition for TB1

Table 1-4 TB1 Signal Connection

Name	Description
FR-A	FRnet port A
FR-B	FRnet port B
DCC-X	Deviation Counter Clear for X axis
DCC-Y	Deviation Counter Clear for Y axis
E-PLS	EXT pulse signal
EMG-A	EMG input signal for all axes
E-GND	EXT power ground

■ TB2

The connector TB2 is 5-pin connector that enables you to connect to the signals of your motor drivers. Fig.1-4 shows the pin assignment for the 5-pin connector on the DN-8468M, and the Table 1-5 shows its I/O connector signal description.

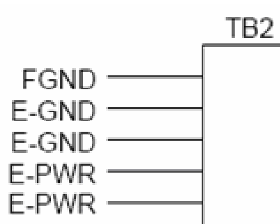


Fig. 1-4 Pin definition for TB2

Table 1-5 TB2 Signal Connection

Pin name	Description
E-PWR	EXT power supply +24V
E-GND	EXT power ground
FGND	Frame ground

▶ **Note:** Don't reverse connect signals with E_PWR and E_GND. Serious damage to your motion card and motion controller might be happened.

■ CN-XA, CN-YA, CN-ZA, CN-UA (CNA connector for each AXIS)

The connectors CN-XA, CN-YA, CN-ZA, and CN-UA are 20-pin connectors that enable you to connect to the CNA connector of Mitsubishi motor drivers. Fig.1-5 shows the pin assignment for the 20-pin connector on the DN-8468M, and the Table 1-6 shows its I/O connector signal description.

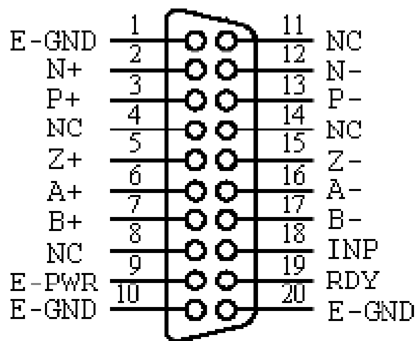


Fig. 1-5 Pin definition for CN-XA, CN-YA, CN-ZA, CN-UA

Table 1-6 CNA Signal Connection

Name	Number	Description
A+	6	Encoder A-Phase (+)
A-	16	Encoder A-Phase (-)
B+	7	Encoder B-Phase (+)
B-	17	Encoder B-Phase (-)
Z+	5	Encoder Z-Phase (+)
Z-	15	Encoder Z-Phase (-)
P+	3	Positive Direction Pulse Output(+)
P-	13	Positive Direction Pulse Output(-)
N+	2	Negative Direction Pulse Output(+)
N-	12	Negative Direction Pulse Output(-)
INP	18	Servo In Position
RDY	19	Servo Ready
E-PWR	9	EXT power +24V
E-GND	1, 10, 20	EXT power ground
NC	4,8,11,14	No connection

- **Note 1:** There are two sets encoder signals for X and Y axes. In X axis, one is from CN-XA and the other is from CN5. In Y axis, one is from CN-YA and the other is from CN6. Users can select encoder signals from JP1 and JP2, respectively.
- **Note 2:** In Z and U axes, only one set of encoder signals is used for each axis. In Z axis, do not connect CN-ZA and CN7 at the same time. In U axis, do not connect CN-UA and CN8 at the same time.
- **Note 3 :** Don't connect NC (not connected) signals. Connecting these signals could cause permanent damage to your motion controller.

■ CN-XB, CN-YB, CN-ZB, CN-UB (CNB connector for each AXIS)

The connectors CN-XB, CN-YB, CN-ZB, and CN-UB are 20-pin connectors that enable you to connect to the CNB connector of your motor drivers. Fig.1-6 shows the pin assignment for the 20-pin connector on the DN-8468M, and the Table 1-7 shows its I/O connector signal description.

Table 1-7 CNB Signal Connection

Pin	Pin	Description
SVON	5	Servo On
RESET	14	Servo Reset
EMG	15	Emergent Stop
ALARM	18	Servo Alarm
E-PWR	13	EXT power +24V
E-GND	1, 10, 16,17, 20	EXT power ground
NC	2, 3, 4, 6, 7, 8, 9, 11, 12, 19	No connection

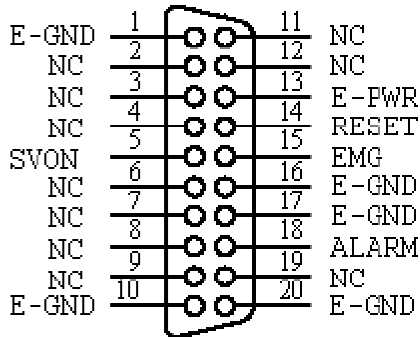


Fig. 1-6 Pin definition for CN-XB, CN-YB CN-ZB, CN-UB

> ▶ **Note:** Don't connect NC (not connected) signals. Connecting these signals could cause permanent damage to your motion controller.

■ CN1~CN4 (The I/O signals of the X, Y, Z, U AXIS)

The connectors CN1~CN4 are 11-pin connectors that enable you to connect to the signals of your motor drivers. Fig.1-7 shows the pin assignment for the 20-pin connector on the DN-8468M, and the Table 1-8 shows its I/O connector signal description.

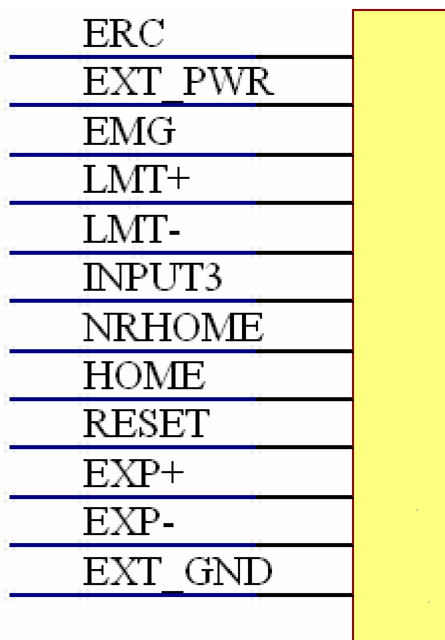


Fig 1-7 Pin definition for CN1~ CN4

Table 1-8 CN1~4 Signal Connection

Name	Number	Description
ERC	12	Error Count Clear
EXT_PWR	11	EXT POWER 24V
EMG	10	Emergent Stop
LMT+	9	Limit switch Input Signal(+)
LMT-	8	Limit switch Input Signal(-)
INPUT3	7	Input Signal (IN3)
NRHOME	6	Near HOME Sensor Input Signal
HOME	5	HOME Sensor Input Signal
RESET	4	RESET Input Signal
EXP+	3	EXT Positive Direction Pulse(+)
EXP-	2	EXT Positive Direction Pulse(-)
EXT_GND	1	EXT POWER Ground

■ CN5~CN8 (The I/O signals of the X, Y, Z, U AXIS)

The connectors CN5~CN8 are 15-pin connectors that enable users to connect the signals to external motor drivers. Fig.1-8 shows the pin assignment for the 15-pin connector on the DN-8468M, and the Table 1-9 shows its I/O connector signal description.

Table 1-9 CN5~8

Name	No.	Description
A+	9	Encoder A-Phase (+)
A-	4	Encoder A-Phase (-)
B+	10	Encoder B-Phase (+)
B-	5	Encoder B-Phase (-)
Z+	11	Encoder Z-Phase (+)
Z-	12	Encoder Z-Phase (-)
P+	1	Positive Direction Pulse Output(+)
P-	7	Positive Direction Pulse Output(-)
N+	2	Negative Direction Pulse Output(+)
N-	8	Negative Direction Pulse Output(-)
E-PWR	15	EXT power +24V
E-GND	3	EXT power ground
EXT-5V	6	EXT power +5V
NC	13, 14	No connection

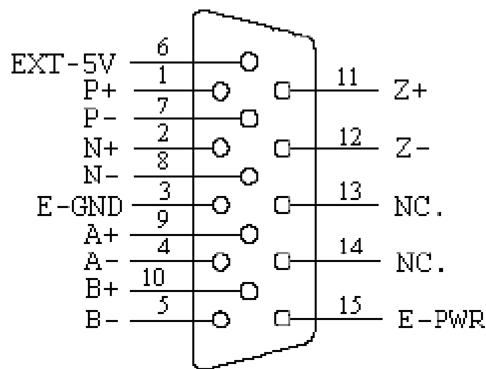


Fig. 1-8 Pin definition for CN5~CN8

- **Note 1:** There are two sets encoder signals for X and Y axes. In X axis, one is from CNX and the other is from CN5. In Y axis, one is from CNY and the other is from CN6. Users can select encoder signals from JP1 and JP2, respectively.
- **Note 2:** In Z and U axes, only one set of encoder signals is used for each axis. In Z axis, do not connect CNZ and CN7 at the same time. In U axis, do not connect CNU and CN8 at the same time.
- **Note 3 :** Don't connect NC (not connected) signals. Connecting these signals could cause permanent damage to your motion controller.

■ RJ1 (The I/O signals of the FRnet)

The connectors RJ1 is an 8-pin RJ45 connector that enable you to connect to the signals of FRnet. Fig.1-9 shows the pin assignment for the 8-pin connector on the DN-8468M, and the Table 1-10 shows its I/O connector signal description.

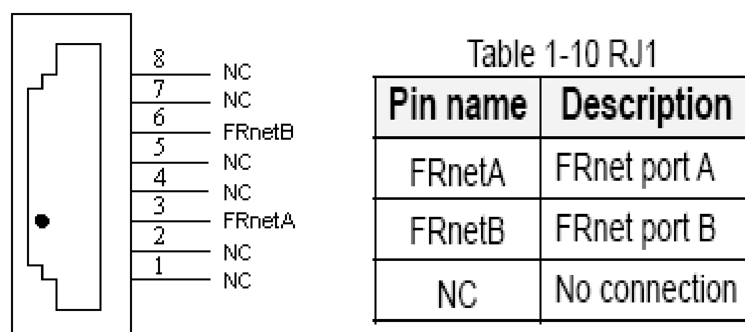


Table 1-10 RJ1

Pin name	Description
FRnetA	FRnet port A
FRnetB	FRnet port B
NC	No connection

Fig. 1-9 Pin definition for RJ1

> **Note:** Don't connect NC (not connected) signals. Connecting these signals could cause permanent damage to your motion controller.

B.1.3 Jumper and Switch Settings

■ JP5

Jumper 5 controls the EMG-A signal of the TB1 connector. The following diagram is shown the selection condition of the jumper 5.

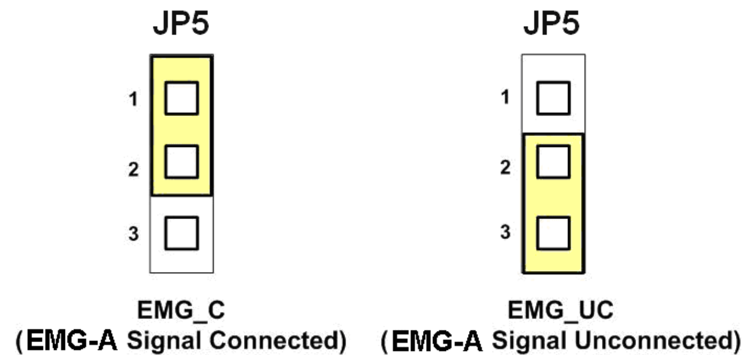


Fig. 1-10 Jumper 5 setting

■ JP1, JP2

The encoder signals of axis X and axis Y can be chosen from servo driver encoder or external encoder. Fig. 1-11 shows that the encoder signals are selected from servo driver encoder. In meantime, Fig. 1-12 shows that the encoder signals are selected from external encoder.

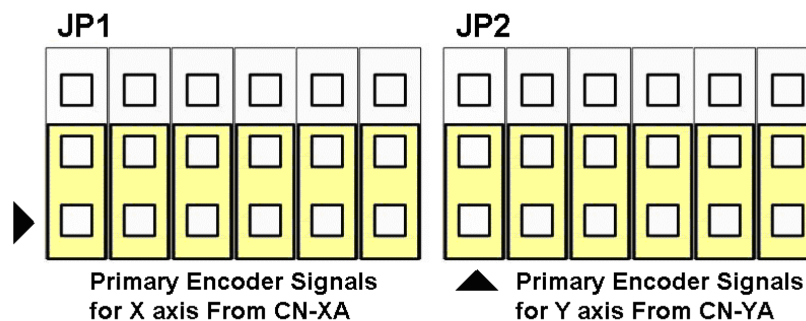


Fig. 1-11 Primary encoder signals setting

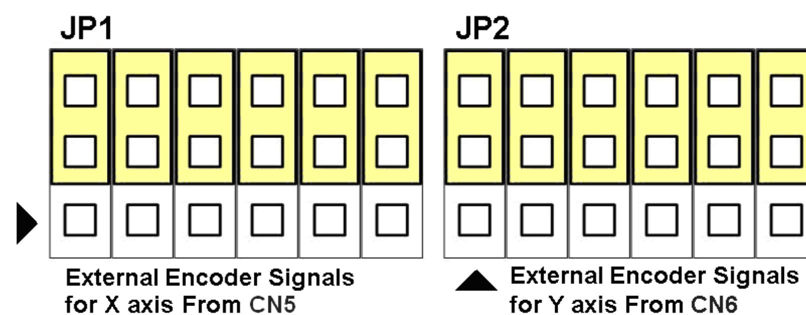


Fig. 1-12 External encoder signals setting

■ EMG SW

The emergency stop signal for each servo ampilfier can be selected from EMG SW. The number 1, 2 , 3, 4 on EMG SW are denoted as axis X, Y, Z, U, respectively. Fig. 1-13 is the default setting to connect the EMG singals to GND. The EMG signals from CN1 ~ CN4 will not take effect. If the switch is disconnected as shown in Fig. 1-14, the emergency stop signals can be controlled from EMG signals in CN1 ~ CN4.



Fig. 1-13 EMG SW setting for normally GND (Default setting)

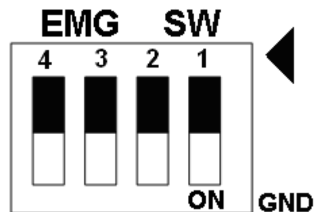


Fig. 1-14 EMG SW setting for user controlled signals.

B.2 DN-8468P Daughter Board

The DN-8468P is the daughter board for Panasonic A4 Series Ampilifier. It has 4-axis I/O signals.

B.2.1 Board Layout for DN-8468P

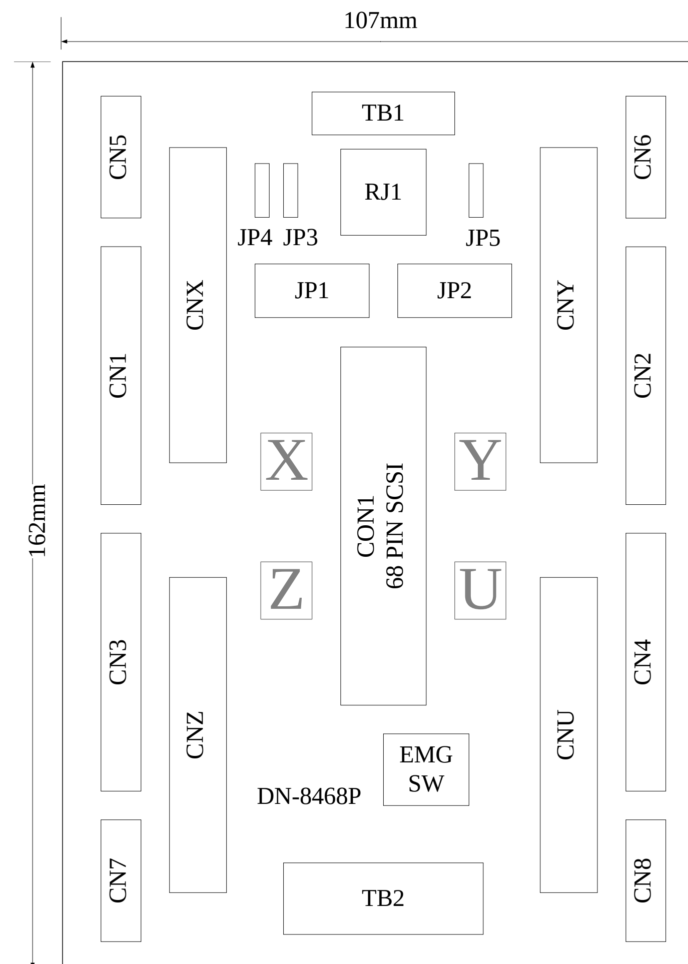


Fig. B2-1 Board layout for the DN-8468P

B.2.2 Signal Connections for DN-8468P

Maintaining signal connections is one of the most important factors in ensuring that your application system is sending and receiving data correctly.

■ Pin Assignment for CON1

The I/O connector on the DN-8468P is a 68-pin SCSI II connector that enables you to connect to the PISO-PS400 motion card. Please refer to the section 2.2.1(page 15).

■ TB1

The connector TB1 is 7-pin connector that enables you to connect to the signals of your motor drivers. Fig.1-3 shows the pin assignment for the 7-pin connector on the DN-8468P, and the Table 1-4 shows its I/O connector signal description.

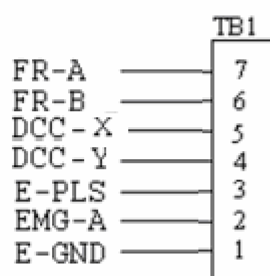


Fig. 1-3 Pin definition for TB1

Table 1-4 TB1 Signal Connection

Name	Description
FR-A	FRnet port A
FR-B	FRnet port B
DCC-X	Deviation Counter Clear for X axis
DCC-Y	Deviation Counter Clear for Y axis
E-PLS	EXT pulse signal
EMG-A	EMG input signal for all axes
E-GND	EXT power ground

■ TB2

The connector TB2 is 5-pin connector that enables you to connect to the signals of your motor drivers. Fig.1-4 shows the pin assignment for the 5-pin connector on the DN-8468P, and the Table 1-5 shows its I/O connector signal description.

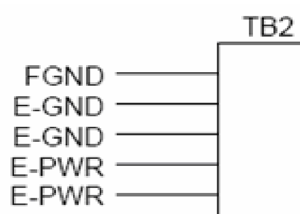


Fig. 1-4 Pin definition for TB2

Table 1-5 TB2 Signal Connection

Pin name	Description
E-PWR	EXT power supply +24V
E-GND	EXT power ground
FGND	Frame ground

▶ **Note:** Don't reverse connect signals with E_PWR and E_GND. Serious damage to your motion card and motion controller might be happened.

■ CNX, CNY, CNZ, CNU (CN X5 connector for each AXIS in Driver)

The connectors CNX, CNY, CNZ, and CNU are 50-pin connectors that enable you to connect to the CN X5 connector of Panasonic motor drivers. Fig.1-5 shows the pin assignment for the 50-pin connector on the DN-8468P, and the Table 1-6 shows its I/O connector signal description.

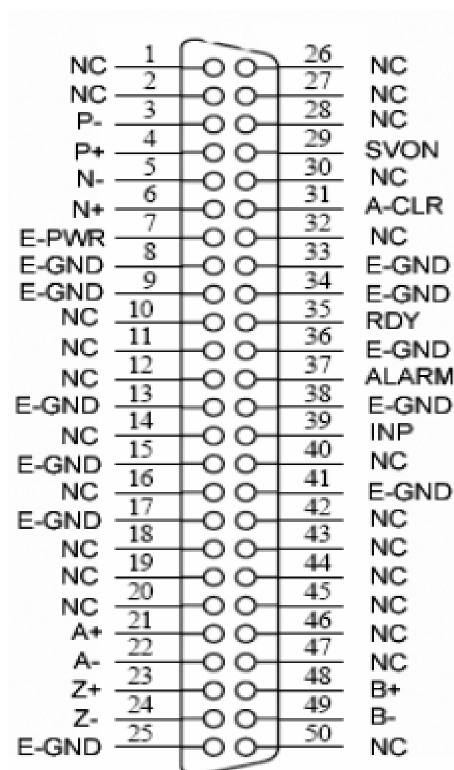


Fig. 1-5 Pin definition for CNX, CNY, CNZ, CNU

Table 1-6 CN X5 Signal Connection

Name	Number	Description
A+	21	Encoder A-Phase (+)
A-	22	Encoder A-Phase (-)
B+	48	Encoder B-Phase (+)
B-	49	Encoder B-Phase (-)
Z+	23	Encoder Z-Phase (+)
Z-	24	Encoder Z-Phase (-)
P+	4	Positive Direction Pulse Output(+)
P-	3	Positive Direction Pulse Output(-)
N+	6	Negative Direction Pulse
N-	5	Negative Direction Pulse Output(-)
INP	39	Servo In Position
RDY	35	Servo Ready
SVON	29	Servo On
A-CLR	31	Alarm Clear
ALARM	37	Servo Alarm
E-PWR	7	EXT power +24V
E-GND	8, 9, 13, 15,17, 25, 33,34, 36, 38,41	EXT power ground
NC	1,2,10,11, 12,14,16, 18,19,20, 26,27,28, 30,32,40, 42,43,44, 45,46,47, 50	No connection

- **Note 1:** There are two sets encoder signals for X and Y axes. In X axis, one is from CNX and the other is from CN5. In Y axis, one is from CNY and the other is from CN6. Users can select encoder signals from JP1 and JP2, respectively.
- **Note 2:** In Z and U axes, only one set of encoder signals is used for each axis. In Z axis, do not connect CNZ and CN7 at the same time. In U axis, do not connect CNU and CN8 at the same time.
- **Note 3 :** Don't connect NC (not connected) signals. Connecting these signals could cause permanent damage to your motion controller.

■ CN1~CN4 (The I/O signals of the X, Y, Z, U AXIS)

The connectors CN1~CN4 are 11-pin connectors that enable you to connect to the signals of your motor drivers. Fig.1-7 shows the pin assignment for the 20-pin connector on the DN-8468P, and the Table 1-8 shows its I/O connector signal description.

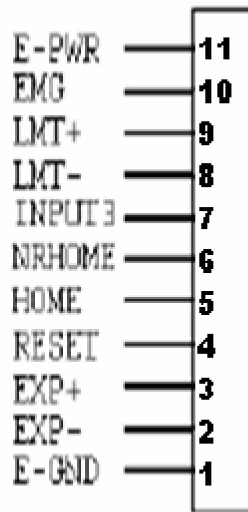


Fig.1-7 Pin definition for CN1 ~ CN4

Table 3-8 CN1~4 Signal Connection

Pin name	Description
E-PWR	EXT power supply +24V
EMG	EMG input signal
LMT+	Limit Switch Input Signal (+)
LMT-	Limit Switch Input Signal (-)
INPUT3	Input Signal (IN3)
NRHOME	Near Home Sensor Input Signal
HOME	Home Sensor Input Signal
RESET	Reset input signal
EXP+	EXT Positive Direction Pulse (+)
EXP-	EXT Negative Direction Pulse (-)
E-GND	EXT power ground

■ CN5~CN8 (The I/O signals of the X, Y, Z, U AXIS)

The connectors CN5~CN8 are 15-pin connectors that enable users to connect the signals to external motor drivers. Fig.1-8 shows the pin assignment for the 15-pin connector on the DN-8468P, and the Table 1-9 shows its I/O connector signal description.

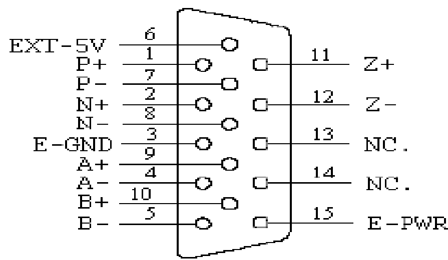


Fig. 1-8 Pin definition for CN5 ~ CN8

Table 1-9 CN5~8

Name	No.	Description
A+	9	Encoder A-Phase (+)
A-	4	Encoder A-Phase (-)
B+	10	Encoder B-Phase (+)
B-	5	Encoder B-Phase (-)
Z+	11	Encoder Z-Phase (+)
Z-	12	Encoder Z-Phase (-)
P+	1	Positive Direction Pulse Output(+)
P-	7	Positive Direction Pulse Output(-)
N+	2	Negative Direction Pulse Output(+)
N-	8	Negative Direction Pulse Output(-)
E-PWR	15	EXT power +24V
E-GND	3	EXT power ground
EXT-5V	6	EXT power +5V
NC	13, 14	No connection

- **Note 1:** There are two sets encoder signals for X and Y axes. In X axis, one is from CNX and the other is from CN5. In Y axis, one is from CNY and the other is from CN6. Users can select encoder signals from JP1 and JP2, respectively.
- **Note 2:** In Z and U axes, only one set of encoder signals is used for each axis. In Z axis, do not connect CNZ and CN7 at the same time. In U axis, do not connect CNU and CN8 at the same time.
- **Note 3 :** Don't connect NC (not connected) signals. Connecting these signals could cause permanent damage to your motion controller.

■ RJ1 (The I/O signals of the FRnet)

The connectors RJ1 is an 8-pin RJ45 connector that enable you to connect to the signals of FRnet. Fig.1-9 shows the pin assignment for the 8-pin connector on the DN-8468P, and the Table 1-10 shows its I/O connector signal description.

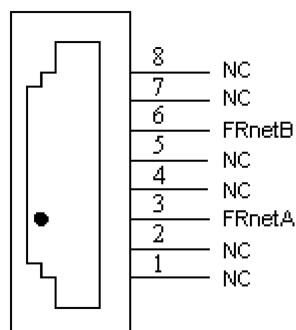


Fig. 1-9 Pin definition for RJ

Table 1-10 RJ1

Pin name	Description
FRnetA	FRnet port A
FRnetB	FRnet port B
NC	No connection

► **Note:** Don’t connect NC (not connected) signals. Connecting these signals could cause permanent damage to your motion controller.

B.2.3 Jumper and Switch Settings

■ JP5

Jumper 5 controls the EMG-A signal of the TB1 connector. The following diagram is shown the selection condition of the jumper 5.

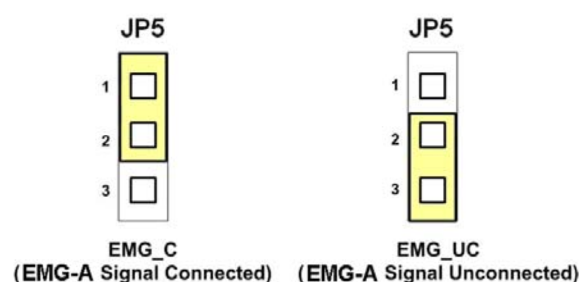


Fig. 1-10 Jumper 5 setting

■ JP1, JP2

The encoder signals of axis X and axis Y can be chosen from servo driver encoder or external encoder. Fig. 1-11 shows that the encoder signals are selected from servo driver encoder. In meantime, Fig. 1-12 shows that the encoder signals are selected from external encoder.

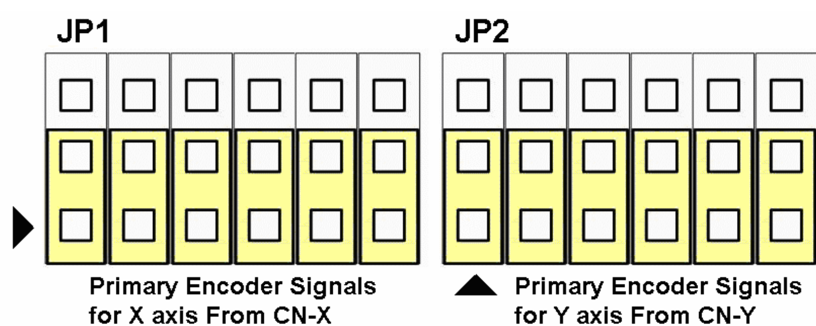


Fig. 1-11 Primary encoder signals setting

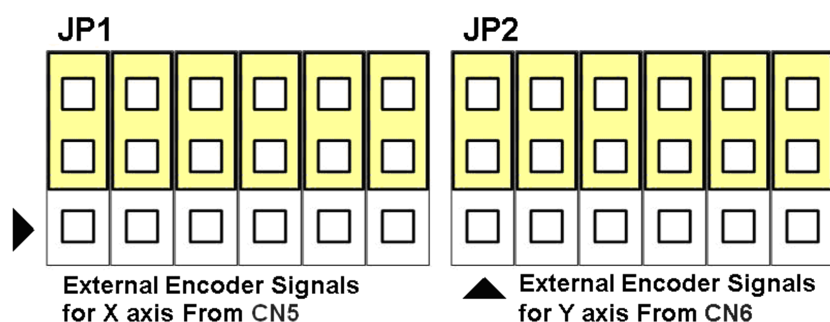


Fig. 1-12 External encoder signals setting

■ EMG SW

The emergency stop signal for each servo ampilfier can be selected from EMG SW. The number 1, 2 , 3, 4 on EMG SW are denoted as axis X, Y, Z, U, respectively. Fig. 1-13 is the default setting to connect the EMG singals to GND. The EMG signals from CN1 ~ CN4 will not take effect. If the switch is disconnected as shown in Fig. 1-14, the emergency stop signals can be controlled from EMG signals in CN1 ~ CN4.

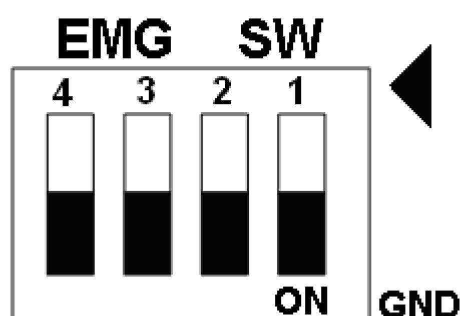


Fig. 1-13 EMG SW setting for normally GND (Default setting)

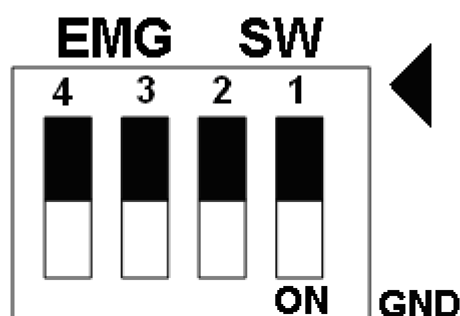


Fig. 1-14 EMG SW setting for user controlled signals.

B.3 DN-8486Y Daughter Board

The DN-8468Y is the daughter board for Yaskawa Ampilifier. It has 4-axis I/O signals.

B.3.1 Board Layout for DN-8468Y

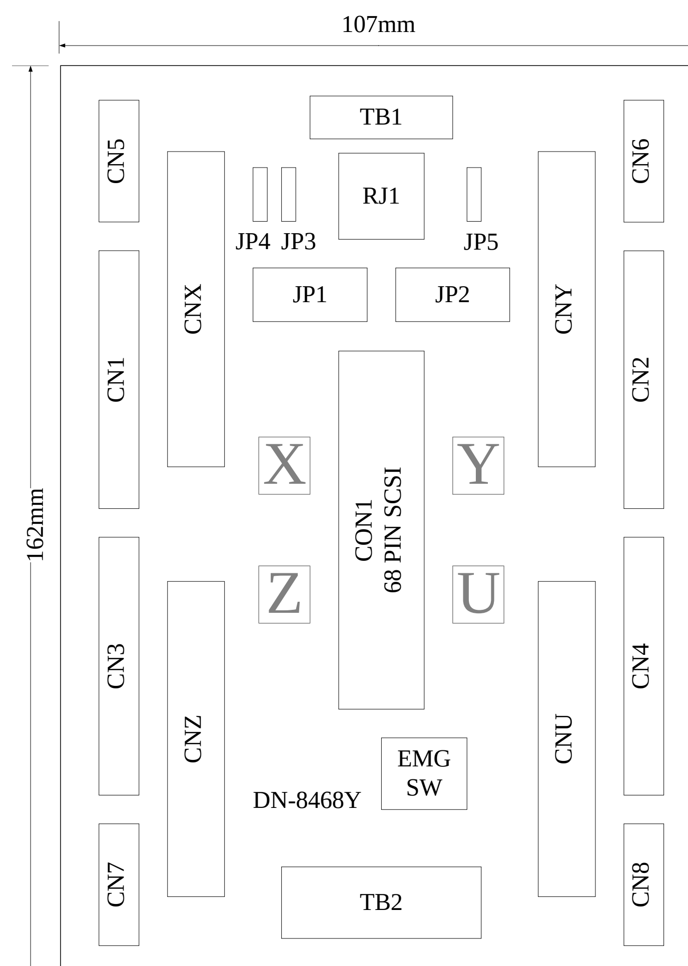


Fig. 3-1 Board layout for the DN-8468Y

B.3.2 Signal Connections for DN-8468Y

Maintaining signal connections is one of the most important factors in ensuring that your application system is sending and receiving data correctly.

■ Pin Assignment for CON1

The I/O connector on the DN-8468Y is a 68-pin SCSI II connector that enables you to connect to the PISO-PS400 motion card. Please refer to the section 2.2.1(page 15).

■ TB1

The connector TB1 is 7-pin connector that enables you to connect to the signals of your motor drivers. Fig.3-3 shows the pin assignment for the 7-pin connector on the DN-8468Y, and the Table 3-4 shows its I/O connector signal description.

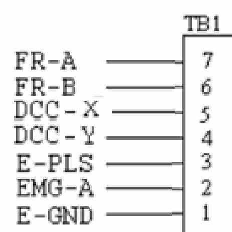


Fig. 1-3 Pin definition for TB1

Table 1-4 TB1 Signal Connection

Name	Description
FR-A	FRnet port A
FR-B	FRnet port B
DCC-X	Deviation Counter Clear for X axis
DCC-Y	Deviation Counter Clear for Y axis
E-PLS	EXT pulse signal
EMG-A	EMG input signal for all axes
E-GND	EXT power ground

■ TB2

The connector TB2 is 5-pin connector that enables you to connect to the signals of your motor drivers. Fig.3-4 shows the pin assignment for the 5-pin connector on the DN-8468Y, and the Table 3-5 shows its I/O connector signal description.

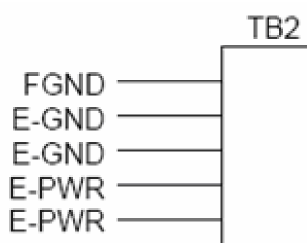


Fig. 1-4 Pin definition for TB2

Table 1-5 TB2 Signal Connection

Pin name	Description
E-PWR	EXT power supply +24V
E-GND	EXT power ground
FGND	Frame ground

▶ **Note:** Don't reverse connect signals with E_PWR and E_GND. Serious damage to your motion card and motion controller might be happened.

■ CNX, CNY, CNZ, CNU (CN X5 connector for each AXIS in Driver)

The connectors CNX, CNY, CNZ, and CNU are 50-pin connectors that enable you to connect to the CN X5 connector of Panasonic motor drivers. Fig.3-5 shows the pin assignment for the 50-pin connector on the DN-8468Y, and the Table 3-6 shows its I/O connector signal description.

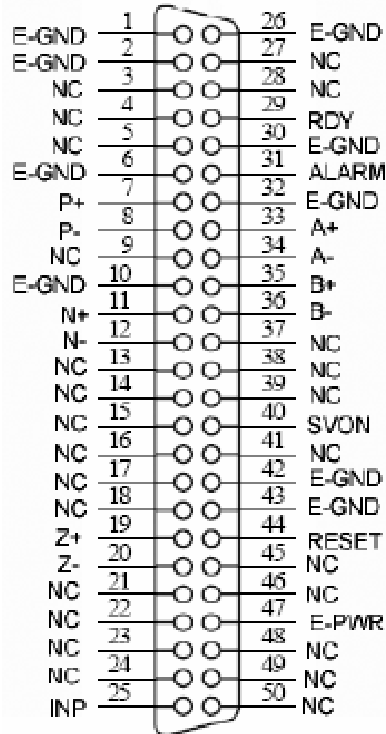


Fig. 3-5 Pin definition for CNX, CNY, CNZ, CNU

Table 3-6 CN1 Signal Connection

Name	Number	Description
A+	33	Encoder A-Phase (+)
A-	34	Encoder A-Phase (-)
B+	35	Encoder B-Phase (+)
B-	36	Encoder B-Phase (-)
Z+	19	Encoder Z-Phase (+)
Z-	20	Encoder Z-Phase (-)
P+	7	Positive Direction Pulse Output(+)
P-	8	Positive Direction Pulse Output(-)
N+	11	Negative Direction Pulse
N-	12	Negative Direction Pulse Output(-)
INP	25	Servo In Position
RDY	29	Servo Ready
SVON	40	Servo On
RESET	44	Parameter Reset
ALARM	31	Servo Alarm
E-PWR	47	EXT power +24V
E-GND	1,2,6,10, 26, 30,32, 42,43	EXT power ground
NC	3,4,5,9, 13,14,15, 16,17,18, 21,22,23, 24,27,28, 37,38,39, 41,45,46, 48,49,50,	No connection

- **Note 1:** There are two sets encoder signals for X and Y axes. In X axis, one is from CNX and the other is from CN5. In Y axis, one is from CNY and the other is from CN6. Users can select encoder signals from JP1 and JP2, respectively.
- **Note 2:** In Z and U axes, only one set of encoder signals is used for each axis. In Z axis, do not connect CNZ and CN7 at the same time. In U axis, do not connect CNU and CN8 at the same time.
- **Note 3 :** Don't connect NC (not connected) signals. Connecting these signals could cause permanent damage to your motion controller.

■ CN1~CN4 (The I/O signals of the X, Y, Z, U AXIS)

The connectors CN1~CN4 are 11-pin connectors that enable you to connect to the signals of your motor drivers. Fig.3-7 shows the pin assignment for the 20-pin connector on the DN-8468Y, and the Table 3-8 shows its I/O connector signal description.

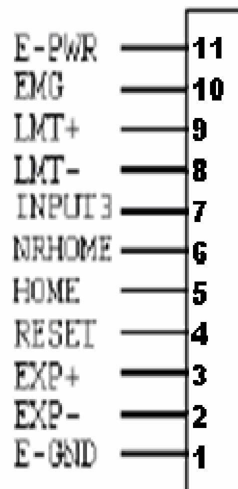


Fig.1-7 Pin definition for CN1 ~ CN4

Table 3-8 CN1~4 Signal Connection

Pin name	Description
E-PWR	EXT power supply +24V
EMG	EMG input signal
LMT+	Limit Switch Input Signal (+)
LMT-	Limit Switch Input Signal (-)
INPUT3	Input Signal (IN3)
NRHOME	Near Home Sensor Input Signal
HOME	Home Sensor Input Signal
RESET	Reset input signal
EXP+	EXT Positive Direction Pulse (+)
EXP-	EXT Negative Direction Pulse (-)
E-GND	EXT power ground

■ CN5~CN8 (The I/O signals of the X, Y, Z, U AXIS)

The connectors CN5~CN8 are 15-pin connectors that enable users to connect the signals to external motor drivers. Fig.3-8 shows the pin assignment for the 15-pin connector on the DN-8468Y, and the Table 3-9 shows its I/O connector signal description.

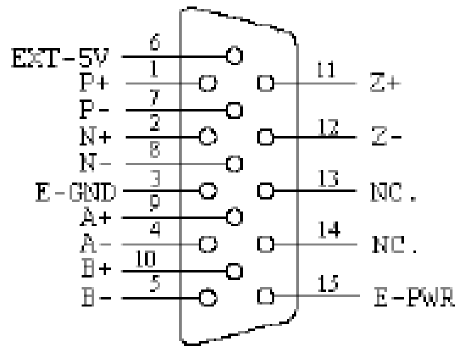


Fig. 3-8 Pin definition for CN5 ~ CN8

Table 3-9 CN5~8

Name	No.	Description
A+	9	Encoder A-Phase (+)
A-	4	Encoder A-Phase (-)
B+	10	Encoder B-Phase (+)
B-	5	Encoder B-Phase (-)
Z+	11	Encoder Z-Phase (+)
Z-	12	Encoder Z-Phase (-)
P+	1	Positive Direction Pulse Output(+)
P-	7	Positive Direction Pulse Output(-)
N+	2	Negative Direction Pulse Output(+)
N-	8	Negative Direction Pulse Output(-)
E-PWR	15	EXT power +24V
E-GND	3	EXT power ground
EXT-5V	6	EXT power +5V
NC	13, 14	No connection

- **Note 1:** There are two sets encoder signals for X and Y axes. In X axis, one is from CNX and the other is from CN5. In Y axis, one is from CNY and the other is from CN6. Users can select encoder signals from JP1 and JP2, respectively.
- **Note 2:** In Z and U axes, only one set of encoder signals is used for each axis. In Z axis, do not connect CNZ and CN7 at the same time. In U axis, do not connect CNU and CN8 at the same time.
- **Note 3 :** Don't connect NC (not connected) signals. Connecting these signals could cause permanent damage to your motion controller.

■ RJ1 (The I/O signals of the FRnet)

The connectors RJ1 is an 8-pin RJ45 connector that enable you to connect to the signals of FRnet. Fig.3-9 shows the pin assignment for the 8-pin connector on the DN-8468Y, and the Table 3-10 shows its I/O connector signal description.

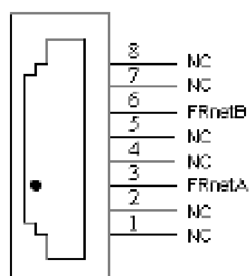


Fig. 3-9 Pin definition for RJ1

Table 3-10 RJ1

Pin name	Description
FRnetA	FRnet port A
FRnetB	FRnet port B
NC	No connection

> **Note:** Don't connect NC (not connected) signals. Connecting these signals could cause permanent damage to your motion controller.

B.3.3 Jumper and Switch Settings

■ JP5

Jumper 5 controls the EMG-A signal of the TB1 connector. The following diagram is shown the selection condition of the jumper 5.

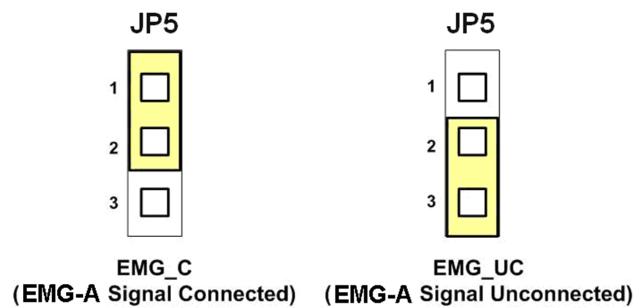


Fig. 3-10 Jumper 5 setting

■ JP1, JP2

The encoder signals of axis X and axis Y can be chosen from servo driver encoder or external encoder. Fig. 3-11 shows that the encoder signals are selected from servo driver encoder. In meantime, Fig. 3-12 shows that the encoder signals are selected from external encoder.

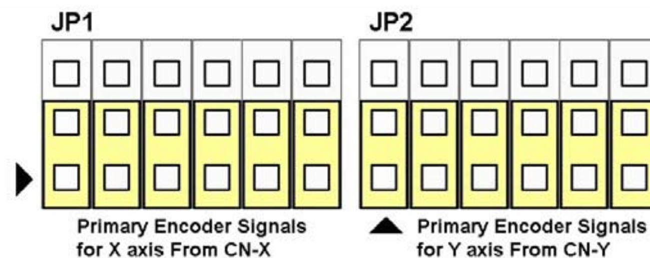


Fig. 3-11 Primary encoder signals setting

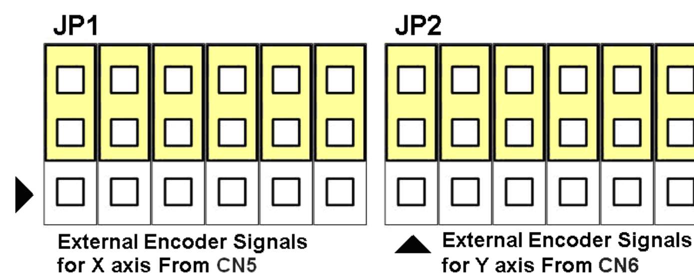


Fig. 3-12 External encoder signals setting

■ EMG SW

The emergency stop signal for each servo ampilfier can be selected from EMG SW. The number 1, 2 , 3, 4 on EMG SW are denoted as axis X, Y, Z, U, respectively. Fig. 3-13 is the default setting to connect the EMG singals to GND. The EMG signals from CN1 ~ CN4 will not take effect. If the switch is disconnected as shown in Fig. 3-14, the emergency stop signals can be controlled from EMG signals in CN1 ~ CN4.



Fig. 3-13 EMG SW setting for normally GND (Default setting)

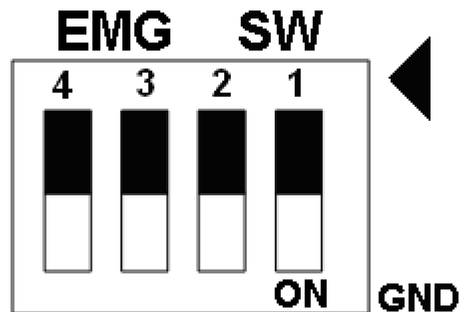


Fig. 3-14 EMG SW setting for user controlled signals.

B.4 DN-8468D Daughter Board

The DN-8468D is the daughter board for Delta ASDA-A Series Ampilifier.   It has 4-axis I/O signals.

B.4.1 Board Layout for DN-8468D

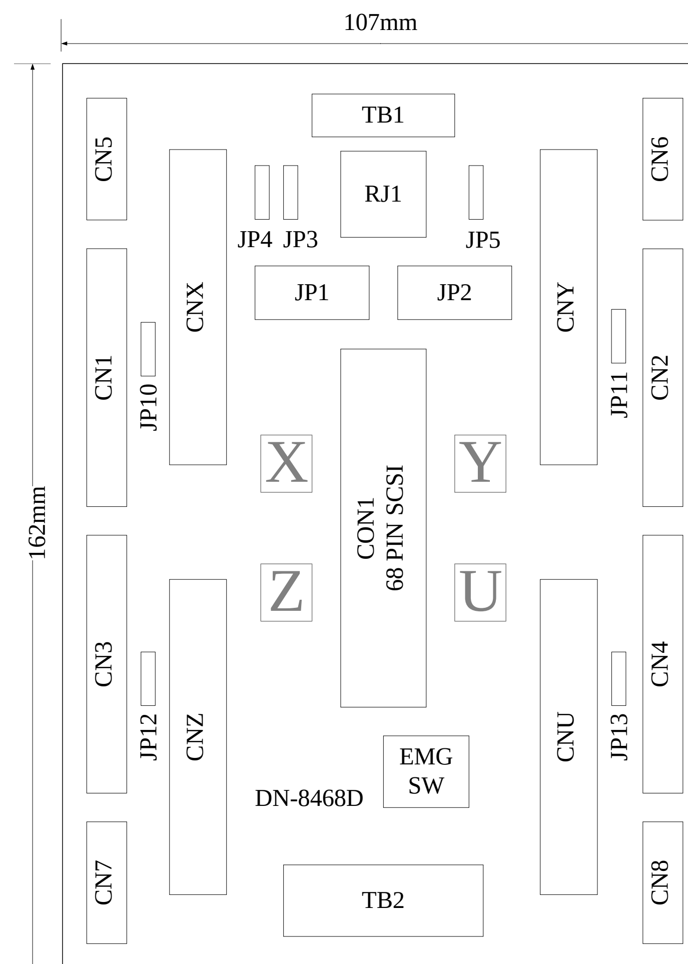


Fig. 3-1   Board layout for the DN-8468D

B.4.2 Signal Connections for DN-8468D

Maintaining signal connections is one of the most important factors in ensuring that your application system is sending and receiving data correctly.

■ Pin Assignment for CON1

The I/O connector on the DN-8468D is a 68-pin SCSI II connector that enables you to connect to the I-8094 motion card. Fig. 3-2 shows the pin assignment for the 68-pin I/O connector on the DN-8468D (or on the I-8094), and refer to Table 3-2, 3-3 for description of each motion I/O signal.

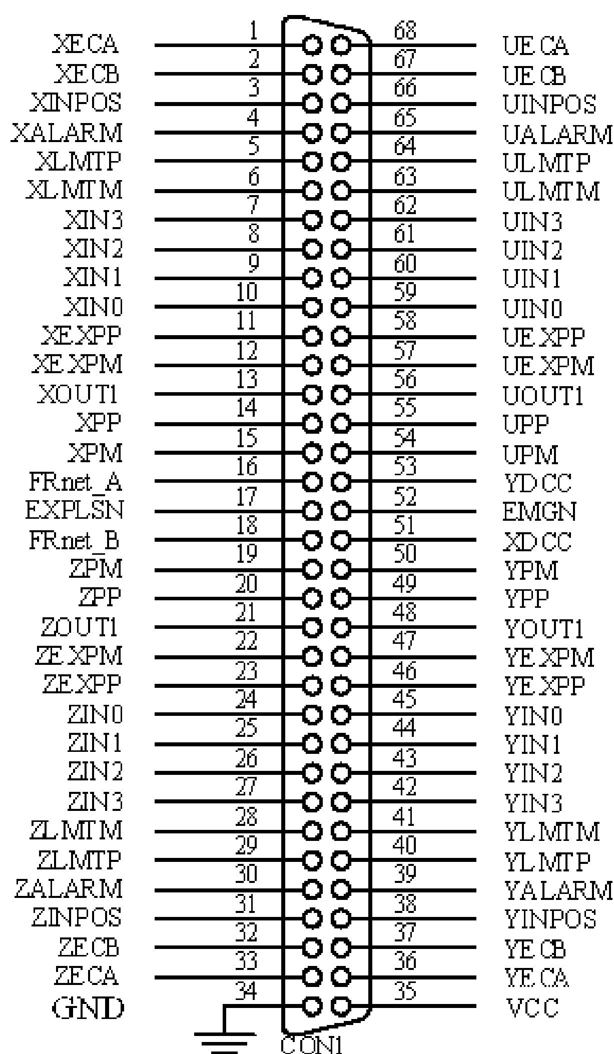


Fig. 3-2 I/O connector pin assignment for the CON1

Table 3-2 DN-8468D I/O connector signal description (part 1)

Pin name	Pin number	Description
XECA	1	Encoder A-phase signal for X axis
YECA	36	Encoder A-phase signal for Y axis
ZECA	33	Encoder A-phase signal for Z axis
UECA	68	Encoder A-phase signal for U axis
XECB	2	Encoder B-Phase signal for X axis
YECB	37	Encoder B-Phase signal for Y axis
ZECB	32	Encoder B-Phase signal for Z axis
UECB	67	Encoder B-Phase signal for U axis
XINPOS	3	In-position signal for X axis
YINPOS	38	In-position signal for Y axis
ZINPOS	31	In-position signal for Z axis
UINPOS	66	In-position signal for U axis
XALARM	4	Alarm signal for X axis
YALARM	39	Alarm signal for Y axis
ZALARM	30	Alarm signal for Z axis
UALARM	65	Alarm signal for U axis
XLMTP	5	Limit switch input signal (+) for X axis
YLMTP	40	Limit switch input signal (+) for Y axis
ZLMTP	29	Limit switch input signal (+) for Z axis
ULMTP	64	Limit switch input signal (+) for U axis
XLMTM	6	Limit switch input signal (-) for X axis
YLMTM	41	Limit switch input signal (-) for Y axis
ZLMTM	28	Limit switch input signal (-) for Z axis
ULMTM	63	Limit switch input signal (-) for U axis
XIN3	7	Input 3 signal for X axis
YIN3	42	Input 3 signal for Y axis
ZIN3	27	Input 3 signal for Z axis
UIN3	62	Input 3 signal for U axis
XIN2	8	Input 2 signal for X axis
XIN2	43	Input 2 signal for Y axis
XIN2	26	Input 2 signal for Z axis
XIN2	61	Input 2 signal for U axis
XIN1	9	Input 1 signal for X axis
YIN1	44	Input 1 signal for Y axis
ZIN1	25	Input 1 signal for Z axis
UIN1	60	Input 1 signal for U axis
XIN0	10	Input 0 signal for X axis
YIN0	45	Input 0 signal for Y axis
ZIN0	24	Input 0 signal for Z axis
UIN0	59	Input 0 signal for U axis

Table 3-3 DN-8468D I/O connector signal description (part 2)

Pin name	Pin number	Description
XEXPP	11	EXT pulsar input signal (+) for X axis
YEXPP	46	EXT pulsar input signal (+) for Y axis
ZEXPP	23	EXT pulsar input signal (+) for Z axis
UEXPP	58	EXT pulsar input signal (+) for U axis
XEXPM	12	EXT pulsar input signal (-) for X axis
YEXPM	47	EXT pulsar input signal (-) for Y axis
ZEXPM	22	EXT pulsar input signal (-) for Z axis
UEXPM	57	EXT pulsar input signal (-) for U axis
XDRIVE	13	Driver enable signal for X axis
YDRIVE	48	Driver enable signal for Y axis
ZDRIVE	21	Driver enable signal for Z axis
UDRIVE	56	Driver enable signal for U axis
XPP	14	Driving pulsar signal (+) for X axis
YPP	49	Driving pulsar signal (+) for Y axis
ZPP	20	Driving pulsar signal (+) for Z axis
UPP	55	Driving pulsar signal (+) for U axis
XPM	15	Driving pulsar signal (+) for X axis
YPM	50	Driving pulsar signal (+) for Y axis
ZPM	19	Driving pulsar signal (+) for Z axis
UPM	54	Driving pulsar signal (+) for U axis
XOUT1	16	Output 1 signal for X axis
YOUT1	48	Output 1 signal for Y axis
ZOUT1	21	Output 1 signal for Z axis
UOUT1	56	Output 1 signal for U axis
EXPLSN1	17	EXT pulse input signal for interpolation
EMGN1	52	Emergency stop input signal
FRnetA	16	FRnet port A
FRnetB	18	FRnet port B
XDCC	51	Deviation Counter Clear for X axis
YDCC	53	Deviation Counter Clear for Y axis
GND	34	Ground
VCC	35	External power (12~24V)

■ TB1

The connector TB1 is 7-pin connector that enables you to connect to the signals of your motor drivers. Fig.3-3 shows the pin assignment for the 7-pin connector on the DN-8468D, and the Table 3-4 shows its I/O connector signal description.

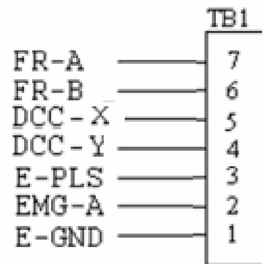


Fig. 1-3 Pin definition for TB1

Table 1-4 TB1 Signal Connection

Name	Description
FR-A	FRnet port A
FR-B	FRnet port B
DCC-X	Deviation Counter Clear for X axis
DCC-Y	Deviation Counter Clear for Y axis
E-PLS	EXT pulse signal
EMG-A	EMG input signal for all axes
E-GND	EXT power ground

■ TB2

The connector TB2 is 5-pin connector that enables you to connect to the signals of your motor drivers. Fig.3-4 shows the pin assignment for the 5-pin connector on the DN-8468D, and the Table 3-5 shows its I/O connector signal description.

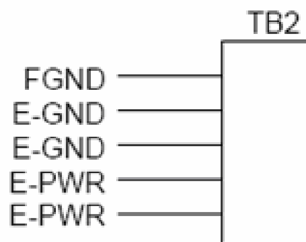


Fig. 1-4 Pin definition for TB2

Table 1-5 TB2 Signal Connection

Pin name	Description
E-PWR	EXT power supply +24V
E-GND	EXT power ground
FGND	Frame ground

▶ **Note:** Don't reverse connect signals with E_PWR and E_GND. Serious damage to your motion card and motion controller might be happened.

■ CNX, CNY, CNZ, CNU (CN 1 connector for each AXIS in Driver)

The connectors CNX, CNY, CNZ, and CNU are 50-pin connectors that enable you to connect to the CN1 connector of Delta ASDA-A series motor drivers. Fig.3-5 shows the pin assignment for the 50-pin connector on the DN-8468D, and the Table 3-6 shows its I/O connector signal description.

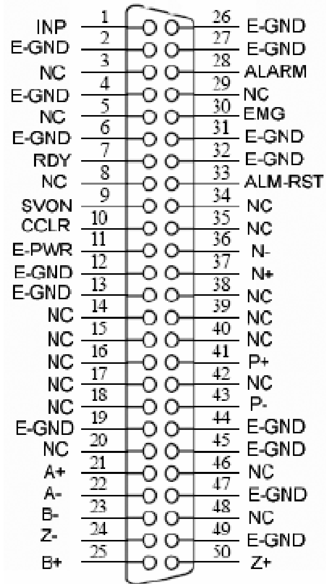


Fig. 3-5 Pin definition for CNX, CNY, CNZ, CNU

Table 3-6 CN 1 Signal Connection

Name	Number	Description
A+	21	Encoder A-Phase (+)
A-	22	Encoder A-Phase (-)
B+	25	Encoder B-Phase (+)
B-	23	Encoder B-Phase (-)
Z+	50	Encoder Z-Phase (+)
Z-	24	Encoder Z-Phase (-)
P+	41	Positive Direction Pulse Output(+)
P-	43	Positive Direction Pulse Output(-)
N+	37	Negative Direction Pulse Output(+)
N-	36	Negative Direction Pulse Output(-)
INP	1	Servo In Position
RDY	7	Servo Ready
SVON	9	Servo On
ALM-RST	33	Alarm Reset
CCLR	10	Error Counter Clear
ALARM	28	Servo Alarm
EMG	30	Emergent Stop
E-PWR	11	EXT power +24V
E-GND	2,4,6,12, 13,19,26, 27,31,32, 44,45,47, 49	EXT power ground
NC	3,5,8,14, 15,16,17, 18,20,29, 34,35,38 39,40,42, 46	No connection

- **Note 1:** There are two sets encoder signals for X and Y axes. In X axis, one is from CNX and the other is from CN5. In Y axis, one is from CNY and the other is from CN6. Users can select encoder signals from JP1 and JP2, respectively.
- **Note 2:** In Z and U axes, only one set of encoder signals is used for each axis. In Z axis, do not connect CNZ and CN7 at the same time. In U axis, do not connect CNU and CN8 at the same time.
- **Note 3 :** Don't connect NC (not connected) signals. Connecting these signals could cause permanent damage to your motion controller.

■ CN1~CN4 (The I/O signals of the X, Y, Z, U AXIS)

The connectors CN1~CN4 are 11-pin connectors that enable you to connect to the signals of your motor drivers. Fig.3-7 shows the pin assignment for the 20-pin connector on the DN-8468D, and the Table 3-8 shows its I/O connector signal description.

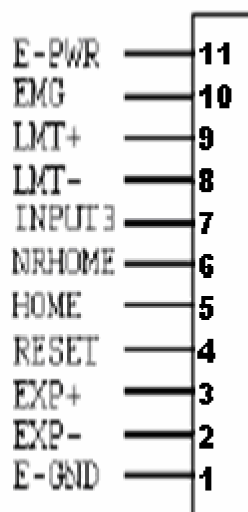


Fig.1-7 Pin definition for CN1 ~ CN4

Table 3-8 CN1~4 Signal Connection

Pin name	Description
E-PWR	EXT power supply +24V
EMG	EMG input signal
LMT+	Limit Switch Input Signal (+)
LMT-	Limit Switch Input Signal (-)
INPUT3	Input Signal (IN3)
NRHOME	Near Home Sensor Input Signal
HOME	Home Sensor Input Signal
RESET	Reset input signal
EXP+	EXT Positive Direction Pulse (+)
EXP-	EXT Negative Direction Pulse (-)
E-GND	EXT power ground

■ CN5~CN8 (The I/O signals of the X, Y, Z, U AXIS)

The connectors CN5~CN8 are 15-pin connectors that enable users to connect the signals to external motor drivers. Fig.3-8 shows the pin assignment for the 15-pin connector on the DN-8468D, and the Table 3-9 shows its I/O connector signal description.

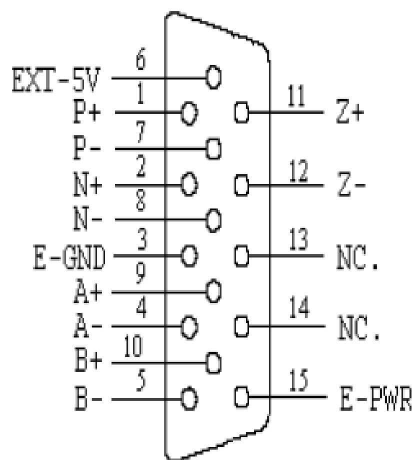


Fig. 3-8 Pin definition for CN5 ~ CN8

Table 3-9 CN5~8

Name	No.	Description
A+	9	Encoder A-Phase (+)
A-	4	Encoder A-Phase (-)
B+	10	Encoder B-Phase (+)
B-	5	Encoder B-Phase (-)
Z+	11	Encoder Z-Phase (+)
Z-	12	Encoder Z-Phase (-)
P+	1	Positive Direction Pulse Output(+)
P-	7	Positive Direction Pulse Output(-)
N+	2	Negative Direction Pulse Output(+)
N-	8	Negative Direction Pulse Output(-)
E-PWR	15	EXT power +24V
E-GND	3	EXT power ground
EXT-5V	6	EXT power +5V
NC	13, 14	No connection

- **Note 1:** There are two sets encoder signals for X and Y axes. In X axis, one is from CNX and the other is from CN5. In Y axis, one is from CNY and the other is from CN6. Users can select encoder signals from JP1 and JP2, respectively.
- **Note 2:** In Z and U axes, only one set of encoder signals is used for each axis. In Z axis, do not connect CNZ and CN7 at the same time. In U axis, do not connect CNU and CN8 at the same time.
- **Note 3 :** Don't connect NC (not connected) signals. Connecting these signals could cause permanent damage to your motion controller.

■ RJ1 (The I/O signals of the FRnet)

The connectors RJ1 is an 8-pin RJ45 connector that enable you to connect to the signals of FRnet. Fig.3-9 shows the pin assignment for the 8-pin connector on the DN-8468D, and the Table 3-10 shows its I/O connector signal description.

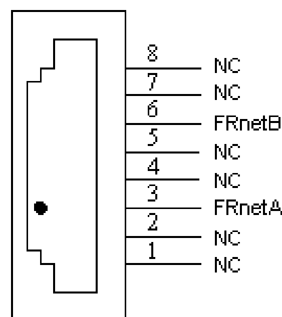


Fig. 3-9 Pin definition for RJ1

Table 3-10 RJ1

Pin name	Description
FRnetA	FRnet port A
FRnetB	FRnet port B
NC	No connection

- **Note:** Don't connect NC (not connected) signals. Connecting these signals could cause permanent damage to your motion controller.

B.4.3 Jumper and Switch Settings

■ JP5

Jumper 5 controls the EMG-A signal of the TB1 connector. The following diagram is shown the selection condition of the jumper 5.

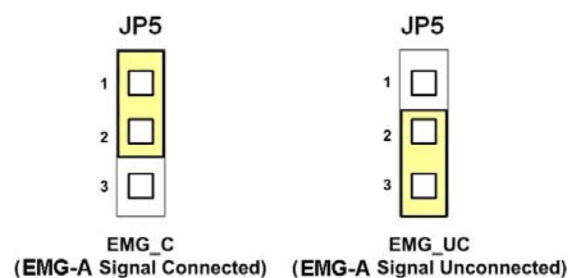


Fig. 3-10 Jumper 5 setting

■ JP1, JP2

The encoder signals of axis X and axis Y can be chosen from servo driver encoder or external encoder. Fig. 3-11 shows that the encoder signals are selected from servo driver encoder. In meantime, Fig. 3-12 shows that the encoder signals are selected from external encoder.

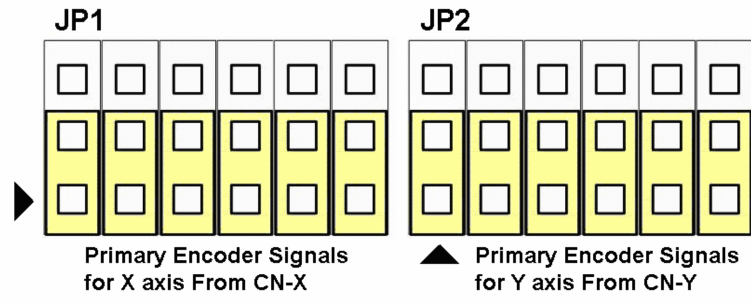


Fig. 3-11 Primary encoder signals setting

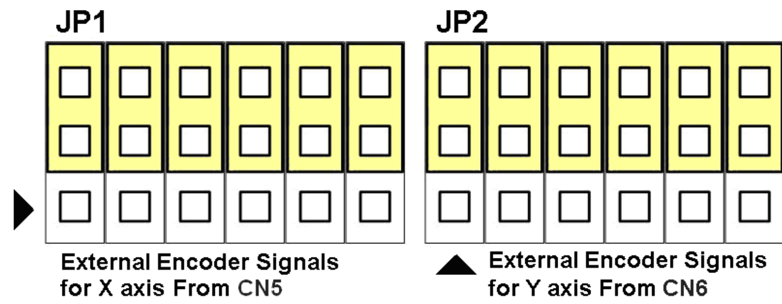


Fig. 3-12 External encoder signals setting

■ SW1

The emergency stop signal for each servo ampilfier can be selected from SW1. The number 1, 2 , 3, 4 on SW1 are denoted as axis X, Y, Z, U, respectively. Fig. 3-13 is the default setting to connect the EMG singals to GND. The EMG signals from CN1 ~ CN4 will not take effect. If the switch is disconnected as shown in Fig. 3-14, the emergency stop signals can be controlled from EMG signals in CN1 ~ CN4.

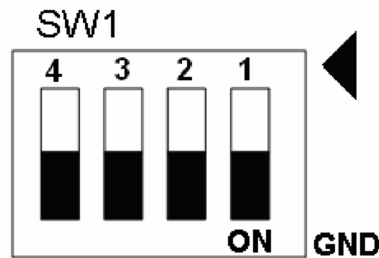


Fig. 3-13 SW1 setting for normally GND (Default setting)

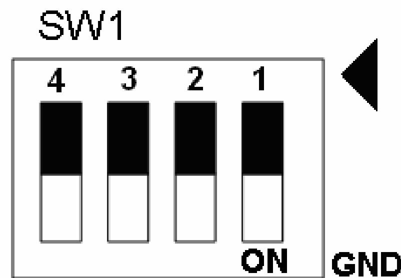


Fig. 3-14 SW1 setting for user controlled signals.

■ JP10 ~ JP13

Jumper 10 ~ Jumper 13 can select the reset function in CN1 ~ CN4 for each axis. The following diagram is shown the selection condition of the JP10.

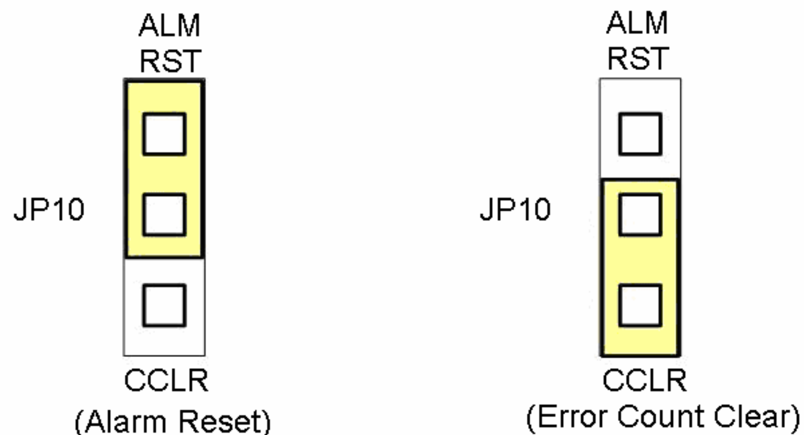


Fig. 3-15 JP 10 ~ 13 setting

B.5 DN-8468FB Daughter Board

The DN-8468FB is the daughter board for FUJI FALDIC-W Series Ampilifier. It has 4-axis I/O signals.

B.5.1 Board Layout for DN-8468FB

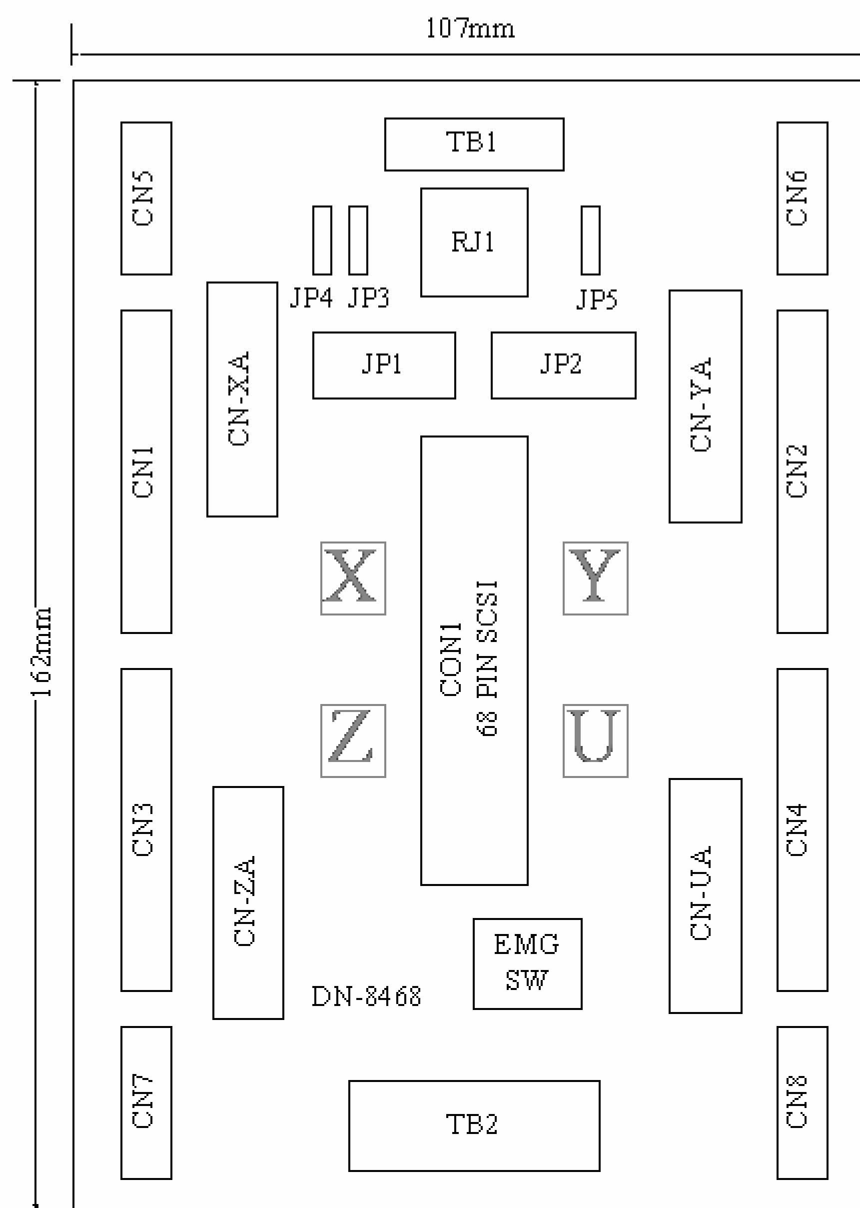


Fig. 3-1 Board layout for the DN-8468FB

B.5.2 Signal Connections for DN-8468FB

Maintaining signal connections is one of the most important factors in ensuring that your application system is sending and receiving data correctly.

■ Pin Assignment for CON1

The I/O connector on the DN-8468FB is a 68-pin SCSI II connector that enables you to connect to the I-8094 motion card. Fig. 3-2 shows the pin assignment for the 68-pin I/O connector on the DN-8468FB (or on the I-8094), and refer to Table 3-2, 3-3 for description of each motion I/O signal.

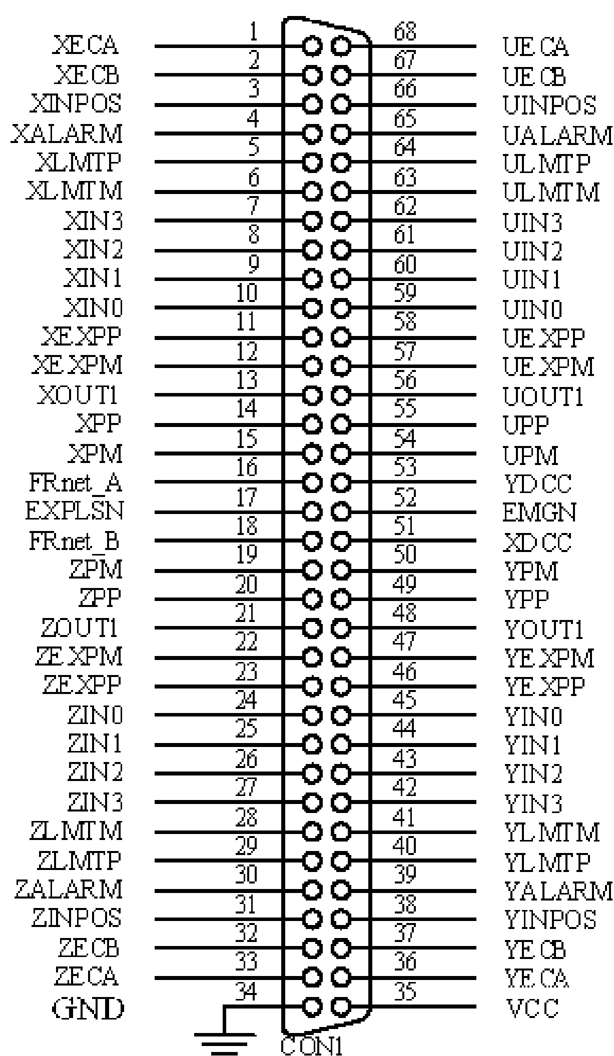


Fig. 3-2 I/O connector pin assignment for the CON1

Table 3-2 DN-8468FB I/O connector signal description (part 1)

Pin name	Pin number	Description
XECA	1	Encoder A-phase signal for X axis
YECA	36	Encoder A-phase signal for Y axis
ZECA	33	Encoder A-phase signal for Z axis
UECA	68	Encoder A-phase signal for U axis
XECB	2	Encoder B-Phase signal for X axis
YECB	37	Encoder B-Phase signal for Y axis
ZECB	32	Encoder B-Phase signal for Z axis
UECB	67	Encoder B-Phase signal for U axis
XINPOS	3	In-position signal for X axis
YINPOS	38	In-position signal for Y axis
ZINPOS	31	In-position signal for Z axis
UINPOS	66	In-position signal for U axis
XALARM	4	Alarm signal for X axis
YALARM	39	Alarm signal for Y axis
ZALARM	30	Alarm signal for Z axis
UALARM	65	Alarm signal for U axis
XLMTP	5	Limit switch input signal (+) for X axis
YLMTP	40	Limit switch input signal (+) for Y axis
ZLMTP	29	Limit switch input signal (+) for Z axis
ULMTP	64	Limit switch input signal (+) for U axis
XLMTM	6	Limit switch input signal (-) for X axis
YLMTM	41	Limit switch input signal (-) for Y axis
ZLMTM	28	Limit switch input signal (-) for Z axis
ULMTM	63	Limit switch input signal (-) for U axis
XIN3	7	Input 3 signal for X axis
YIN3	42	Input 3 signal for Y axis
ZIN3	27	Input 3 signal for Z axis
UIN3	62	Input 3 signal for U axis
XIN2	8	Input 2 signal for X axis
XIN2	43	Input 2 signal for Y axis
XIN2	26	Input 2 signal for Z axis
XIN2	61	Input 2 signal for U axis
XIN1	9	Input 1 signal for X axis
YIN1	44	Input 1 signal for Y axis
ZIN1	25	Input 1 signal for Z axis
UIN1	60	Input 1 signal for U axis
XIN0	10	Input 0 signal for X axis
YIN0	45	Input 0 signal for Y axis
ZIN0	24	Input 0 signal for Z axis
UIN0	59	Input 0 signal for U axis

Table 3-3 DN-8468FB I/O connector signal description (part 2)

Pin name	Pin number	Description
XEXPP	11	EXT pulsar input signal (+) for X axis
YEXPP	46	EXT pulsar input signal (+) for Y axis
ZEXPP	23	EXT pulsar input signal (+) for Z axis
UEXPP	58	EXT pulsar input signal (+) for U axis
XEXPM	12	EXT pulsar input signal (-) for X axis
YEXPM	47	EXT pulsar input signal (-) for Y axis
ZEXPM	22	EXT pulsar input signal (-) for Z axis
UEXPM	57	EXT pulsar input signal (-) for U axis
XDRIVE	13	Driver enable signal for X axis
YDRIVE	48	Driver enable signal for Y axis
ZDRIVE	21	Driver enable signal for Z axis
UDRIVE	56	Driver enable signal for U axis
XPP	14	Driving pulsar signal (+) for X axis
YPP	49	Driving pulsar signal (+) for Y axis
ZPP	20	Driving pulsar signal (+) for Z axis
UPP	55	Driving pulsar signal (+) for U axis
XPM	15	Driving pulsar signal (+) for X axis
YPM	50	Driving pulsar signal (+) for Y axis
ZPM	19	Driving pulsar signal (+) for Z axis
UPM	54	Driving pulsar signal (+) for U axis
XOUT1	16	Output 1 signal for X axis
YOUT1	48	Output 1 signal for Y axis
ZOUT1	21	Output 1 signal for Z axis
UOUT1	56	Output 1 signal for U axis
EXPLSN1	17	EXT pulse input signal for interpolation
EMGN1	52	Emergency stop input signal
FRnetA	16	FRnet port A
FRnetB	18	FRnet port B
XDCC	51	Deviation Counter Clear for X axis
YDCC	53	Deviation Counter Clear for Y axis
GND	34	Ground
VCC	35	External power (12~24V)

■ TB1

The connector TB1 is 7-pin connector that enables you to connect to the signals of your motor drivers. Fig.3-3 shows the pin assignment for the 7-pin connector on the DN-8468FB, and the Table 3-4 shows its I/O connector signal description.

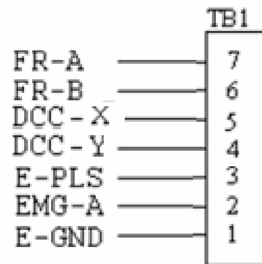


Fig. 1-3 Pin definition for TB1

Table 1-4 TB1 Signal Connection

Name	Description
FR-A	FRnet port A
FR-B	FRnet port B
DCC-X	Deviation Counter Clear for X axis
DCC-Y	Deviation Counter Clear for Y axis
E-PLS	EXT pulse signal
EMG-A	EMG input signal for all axes
E-GND	EXT power ground

■ TB2

The connector TB2 is 5-pin connector that enables you to connect to the signals of your motor drivers. Fig.3-4 shows the pin assignment for the 5-pin connector on the DN-8468FB, and the Table 3-5 shows its I/O connector signal description.

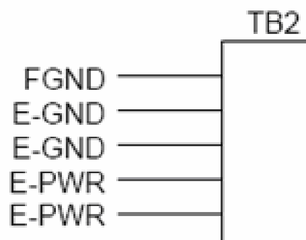


Fig. 1-4 Pin definition for TB2

Table 1-5 TB2 Signal Connection

Pin name	Description
E-PWR	EXT power supply +24V
E-GND	EXT power ground
FGND	Frame ground

► **Note:** Don't reverse connect signals with E_PWR and E_GND. Serious damage to your motion card and motion controller might be happened.

■ CN-X, CN-Y, CN-Z, CN-U (CN1 connector for each AXIS in Driver)

The connectors CN-X, CN-Y, CN-Z, and CN-U are 26-pin connectors that enable you to connect to the CN1 connector of FUJI FALDIC-W series motor drivers. Fig.3-5 shows the pin assignment for the 26-pin connector on the DN-8468FB, and the Table 3-6 shows its I/O connector signal description.

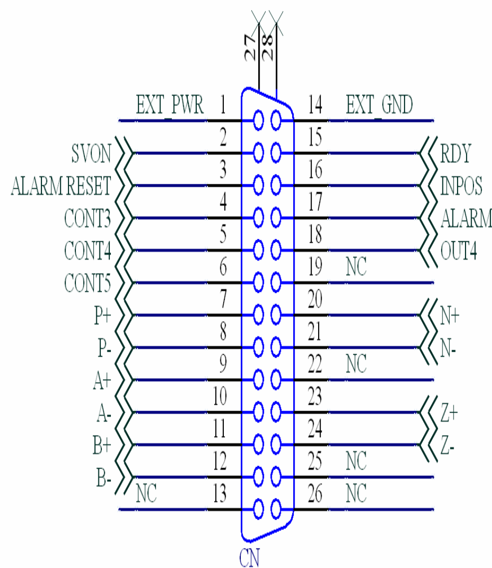


Fig 3-5 Pin definition for CN-X, CN-Y, CN-Z, CN-U

Table 3-6 CN-X ,CN-Y ,CN-Z ,CN-U

Name	No.	Description
EXT_PWR	1	EXT POWER 24V
SVON	2	CONT1 of Servo Motor (default: SVON)
ALARM RESET	3	CONT2 of Servo Motor (default: ALARM RESET)
CONT3	4	CONT3 of Servo Motor
CONT4	5	CONT4 of Servo Motor
CONT5	6	CONT5 of Servo Motor
P+	7	Positive Direction Pulse (+)
P-	8	Positive Direction Pulse (-)
A+	9	Encoder A-phase (+)
A-	10	Encoder A-phase (-)
B+	11	Encoder B-phase (+)
B-	12	Encoder B-phase (-)
NC	13	No connection
EXT_GND	14	EXT POWER Ground
RDY	15	OUT1 of Servo Motor (default: RDY)
INPOS	16	OUT2 of Servo Motor (default: INPOS)
ALARM	17	OUT3 of Servo Motor (default: ALARM)
OUT4	18	OUT4 of Servo Motor
NC	19	No connection
N+	20	Negative Direction Pulse (+)
N-	21	Negative Direction Pulse (-)
NC	22	No connection
Z+	23	Encoder Z-phase (+)
Z-	24	Encoder Z-phase (-)
NC	25	No connection
NC	26	No connection

- **Note 1:** There are two sets encoder signals for X and Y axes. In X axis, one is from CNX and the other is from CN5. In Y axis, one is from CNY and the other is from CN6. Users can select encoder signals from JP1 and JP2, respectively.
- **Note 2:** In Z and U axes, only one set of encoder signals is used for each axis. In Z axis, do not connect CNZ and CN7 at the same time. In U axis, do not connect CNU and CN8 at the same time.
- **Note 3 :** Don't connect NC (not connected) signals. Connecting these signals could cause permanent damage to your motion controller.

■ CN1~CN4 (The I/O signals of the X, Y, Z, U AXIS)

The connectors CN1~CN4 are 12-pin connectors that enable you to connect to the signals of your motor drivers. Fig.3-7 shows the pin assignment for the 12-pin connector on the DN-8468FB, and the Table 3-8 shows its I/O connector signal description.

Table 3-8 CN1~CN4

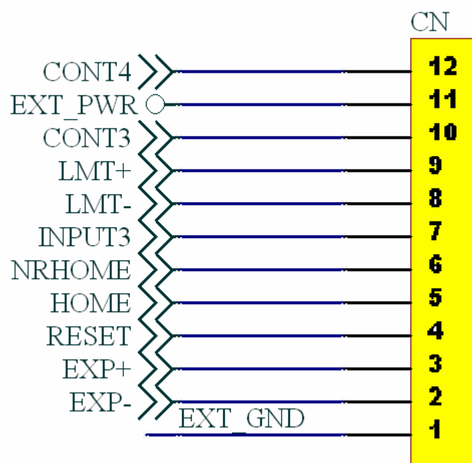


Fig 3-7 Pin definition for CN1~ CN4

Name	Number	Description
CONT4	12	CONT4 of Servo Motor
EXT_PWR	11	EXT POWER 24V
CONT3	10	CONT3 of Servo Motor
LMT+	9	Limit switch Input Signal(+)
LMT-	8	Limit switch Input Signal(-)
INPUT3	7	Input Signal (IN3)
NRHOME	6	Near HOME Sensor Input Signal
HOME	5	HOME Sensor Input Signal
RESET	4	RESET Input Signal
EXP+	3	EXT Positive Direction Pulse(+)
EXP-	2	EXT Positive Direction Pulse(-)
EXT_GND	1	EXT POWER Ground

■ CN5~CN8 (The I/O signals of the X, Y, Z, U AXIS)

The connectors CN5~CN8 are 15-pin connectors that enable users to connect the signals to external motor drivers. Fig.3-8 shows the pin assignment for the 15-pin connector on the DN-8468FB, and the Table 3-9 shows its I/O connector signal description.

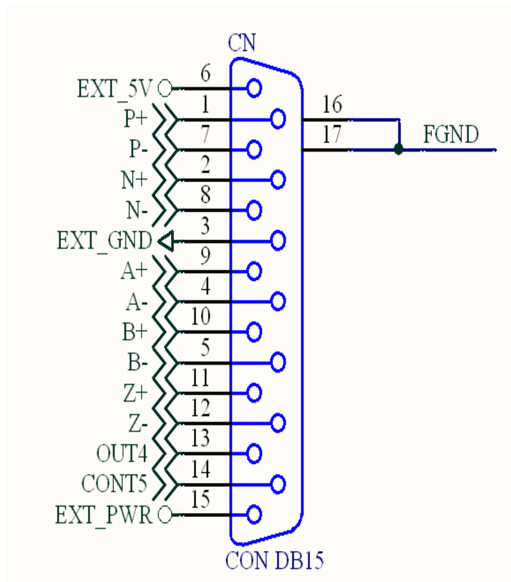


Fig 3-8 Pin definition for CN5~ CN8

Table 3-9 CN5~CN8

Name	Number	Description
P+	1	Positive Direction Pulse(+)
N+	2	Negative Direction Pulse(+)
EXT_GND	3	EXT POWER Ground
A-	4	Encoder A-phase(-)
B-	5	Encoder B-phase(-)
EXT_5V	6	EXT POWER 5V
P-	7	Positive Direction Pulse(-)
N-	8	Negative Direction Pulse(-)
A+	9	Encoder A-phase(+)
B+	10	Encoder B-phase(+)
Z+	11	Encoder Z-phase(+)
Z-	12	Encoder Z-phase(-)
OUT4	13	OUT4 of Servo Motor
CONT5	14	CONT5 of Servo Motor
EXT_PWR	15	EXT POWER 24V

- **Note 1:** There are two sets encoder signals for X and Y axes. In X axis, one is from CNX and the other is from CN5. In Y axis, one is from CNY and the other is from CN6. Users can select encoder signals from JP1 and JP2, respectively.
- **Note 2:** In Z and U axes, only one set of encoder signals is used for each axis. In Z axis, do not connect CNZ and CN7 at the same time. In U axis, do not connect CNU and CN8 at the same time.
- **Note 3 :** Don't connect NC (not connected) signals. Connecting these signals could cause permanent damage to your motion controller.

■ RJ1 (The I/O signals of the FRnet)

The connectors RJ1 is an 8-pin RJ45 connector that enable you to connect to the signals of FRnet. Fig.3-9 shows the pin assignment for the 8-pin connector on the DN-8468FB, and the Table 3-10 shows its I/O connector signal description.

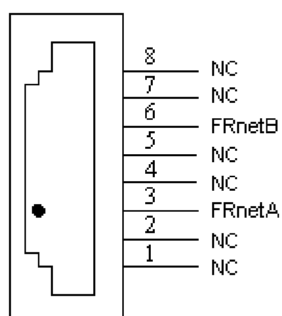


Fig. 3-9 Pin definition for RJ1

Table 3-10 RJ1

Pin name	Description
FRnetA	FRnet port A
FRnetB	FRnet port B
NC	No connection

► **Note:** Don't connect NC (not connected) signals. Connecting these signals could cause permanent damage to your motion controller.

B.5.3 Jumper and Switch Settings

■ JP5

Jumper 5 controls the EMG-A signal of the TB1 connector. The following diagram is shown the selection condition of the jumper 5.

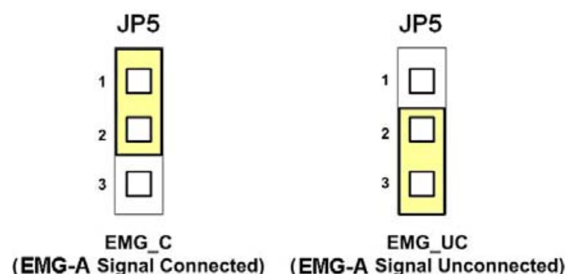


Fig. 3-10 Jumper 5 setting

■ JP1, JP2

The encoder signals of axis X and axis Y can be chosen from servo driver encoder or external encoder. Fig. 3-11 shows that the encoder signals are selected from servo driver encoder. In meantime, Fig. 3-12 shows that the encoder signals are selected from external encoder.

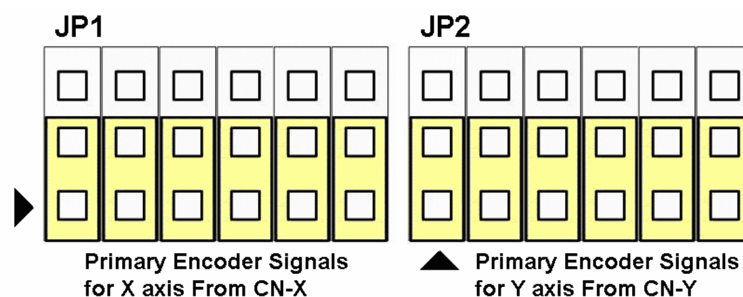


Fig. 3-11 Primary encoder signals setting

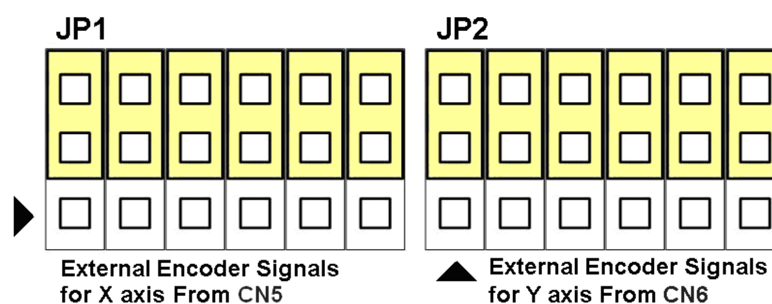


Fig. 3-12 External encoder signals setting

■ SW1

The CONT3 for each servo ampilfier can be selected from SW1. The number 1, 2 , 3, 4 on SW1 are denoted as axis X, Y, Z, U, respectively. Fig. 3-13 is the default setting to connect the CONT3 singals to GND. The CONT3 signals from CN1 ~ CN4 will not take effect. If the switch is disconnected as shown in Fig. 3-14, the CONT3 signals can be controlled from CONT3 signals in CN1 ~ CN4.

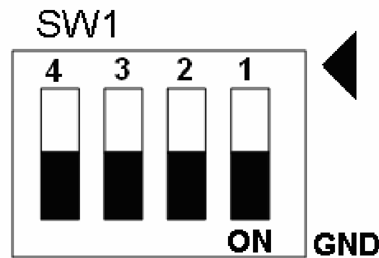


Fig. 3-13 SW1 setting for normally GND (Default setting)

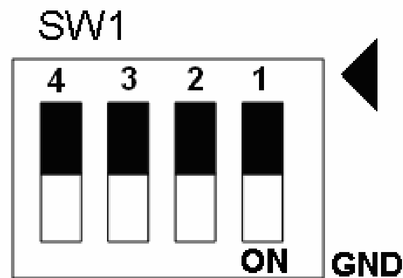


Fig. 3-14 SW1 setting for user controlled signals.